EXABYTE®

EXABYTE 110L AUTOLOADER

PRODUCT MANUAL

1014250 A

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PART NUMBER 1014250 Revision A

REVISION HISTORY

Revision	Date	Description
A	March 2005	Initial release. Replaces 1011618.

NOTE: The most current information about this product is available at Exabyte's World Wide Web site (www.exabyte.com).

Product Warranty Caution

The Exabyte® 110L Autoloader is warranted to be free from defects in materials, parts, and workmanship and will conform to the current product specification upon delivery. For the specific details of your warranty, refer to your sales contract or contact the company from which the autoloader was purchased.

The warranty for the autoloader shall not apply to failures caused by:

- Physical abuse or use not consistent with the operating instructions or product specifications.
- Repair or modification by any one other than Exabyte's personnel or agent in a manner differing from the maintenance instructions provided by Exabyte.
- Removal of the Exabyte identification label(s).
- Physical abuse due to improper packaging of returned autoloader.

If problems with the autoloader occur, contact your maintenance organization; do not void the product warranty by allowing untrained or unauthorized personnel to attempt repairs.

Caution Returning the autoloader in unauthorized packaging may damage the equipment and void the warranty. If you are returning the autoloader for repair, package it in its original packaging (or in replacement packaging obtained from your vendor).

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded cables are required for this device to comply with FCC Rules. Use shielded cables when connecting this device to others.

Industry Canadian Notice per ICES-003

English This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

French Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

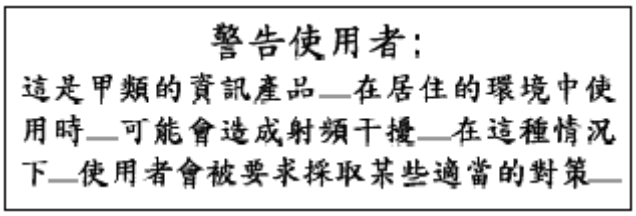
European Notice

This equipment has been tested and complies with the following requirements:

- EN 55022/CISPR 22, Class A
- EN 55024
- EN 61000-3-2
- EN 61000-3-3

Bureau of Standards, Metrology, and Inspection (BSMI) – Taiwan

This equipment has been tested and complies with CNS C 13438, Class A.



CONTACTING EXABYTE

To obtain general information	
Exabyte Corporate Headquarters	Exabyte Corporation 2108 55th Street Boulder, CO USA 80301
	(303) 442-4333
World Wide Web	www.exabyte.com
To obtain technical support	
Exabyte Technical Support	www.exabyte.com/products/hardwarewarranty.cfm
To order supplies and accessories	
Exabyte Sales Support	1-800-774-7172
	1-800-392-8273 (Exabyte Media)
To return equipment for service (RMA Request)	
Exabyte Service	www.exabyte.com/company/about/contact.cfm

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ABOUT THIS MANUAL

This manual describes how to install, configure, operate, maintain, and troubleshoot the Exabyte® 110L LTO™ Ultrium™ Autoloader. It also provides autoloader specifications.

WHERE TO LOOK FOR INFORMATION

Installation

If you are performing first-time installation:

- Read Chapter 1, "Product Overview for an overview of the autoloader's features and components.
- Read Chapter 2, "Installing the Autoloader for hardware installation instructions, including obtaining the necessary accessories, installing cartridges, and connecting the autoloader to a host system.
- Read Chapter 3, "Configuring the Autoloader for configuration instructions, including how to use the operator panel to set autoloader options. If your autoloader is equipped with the Ethernet option and you want to use the autoloader's remote management utility to set configuration options, refer to Chapter 6, "Using the Remote Management Utility for instructions for accessing the utility.

Operation

When you are ready to put the autoloader into operation:

- Read Chapter 4, "Operating the Autoloader to learn about adding and removing cartridges during operation, operating the autoloader in sequential mode, cleaning the tape drive, and performing other basic autoloader operations.
- Read Chapter 5, "Viewing Autoloader Information to learn about viewing information such as code versions, statistics, sensor readings, and cartridge inventory data.
- Read Chapter 6, "Using the Remote Management Utility for information about using the autoloader's remote management utility to change configuration options, view information, issue commands, monitor, and manage autoloader operation across an Ethernet network. The remote management utility is available with autoloaders equipped with the Ethernet option.

Maintenance, Troubleshooting, and Service

If you need to perform basic maintenance, troubleshoot problems, or return the autoloader for service:

- Read Chapter 7, "Maintenance for instructions for replacing the tape drive, uploading new firmware, and creating diagnostic listings.
- Read Chapter 8, "Troubleshooting and Error Codes for troubleshooting tips, definitions of autoloader error codes, and corrective actions for each error situation.
- Read Chapter 9, "Shipping the Autoloader for packing and shipping instructions if you need to return the autoloader for service.

Specifications

To learn about specifications for the autoloader:

- Read Appendix A, Autoloader Specifications for physical, performance, reliability, power, environmental, and safety agency specifications.

RELATED PUBLICATIONS

The following publications provide additional information about the autoloader.

Exabyte 110L Autoloader

- *Exabyte 110L Autoloader Quick Start Guide*, 1014251
- *Installing an Exabyte 221L Library or 110L Autoloader into a Rack*, 1014257
- *Exabyte 110L and 221L SCSI Reference*, 1014275
- *Exabyte Bar Code Label Specification for LTO Ultrium Cartridges*, 1004080
- *Installing or Replacing a Tape Drive in an Exabyte 110L, 221L, or 221L-FC*, 1006159

IBM T400/T800 Ultrium Tape Drives

See the IBM web site at www.storage.ibm.com/tape/lto/oem/index.html to locate documentation and support information for IBM LTO Ultrium tape drives.

Standards

- *Information Technology - SCSI Primary Commands-2 (SPC-2)*, ANSI INCITS 351-2001
- *Information Technology - SCSI-3 Primary Commands (SPC)*, ANSI INCITS 301-1997
- *Information Technology – SCSI Parallel Interface-3 (SPI-3)*, ANSI INCITS 336-2000
- *Information Technology - SCSI Parallel Interface-2 (SPI-2)*, ANSI INCITS 302-1998
- *Information Technology -SCSI Architecture Model-2 (SAM-2)*, ANSI INCITS 366-2003

- *Information Technology - SCSI Stream Commands-2 (SSC-2)*, ANSI INCITS 380-2003
- *Information Technology - SCSI-3 Medium Changer Commands (SMC)*, ANSI INCITS 314-1998
- *ANSI SCSI-3 Fast20 Parallel Interface (Fast-20)*, X3.277 – 1996
- *ANSI High Performance Serial Bus*, ANSI/IEEE 1394 – 1995
- *Information Technology – Serial Bus Protocol 2 (SBP-2)*, ANSI INCITS 325-1998
- *TapeAlert Specification*, NCITS T10/02-142R0, Version 3.0, March 2002
- *EIA Rack Standards*, RS-310-B

CONVENTIONS USED IN THIS MANUAL

This manual uses the following conventions:

Enter: Boxed text indicates keys on the autoloader's operator panel.

Note: Notes provide additional information or suggestions about the topic or procedure being discussed.

! **Important** Read text marked by the "Important" icon for information that will help you complete a procedure or avoid extra steps.

Caution Read text marked by the "CAUTION" icon for information you must know to avoid damaging the autoloader, tape drive, or losing data.

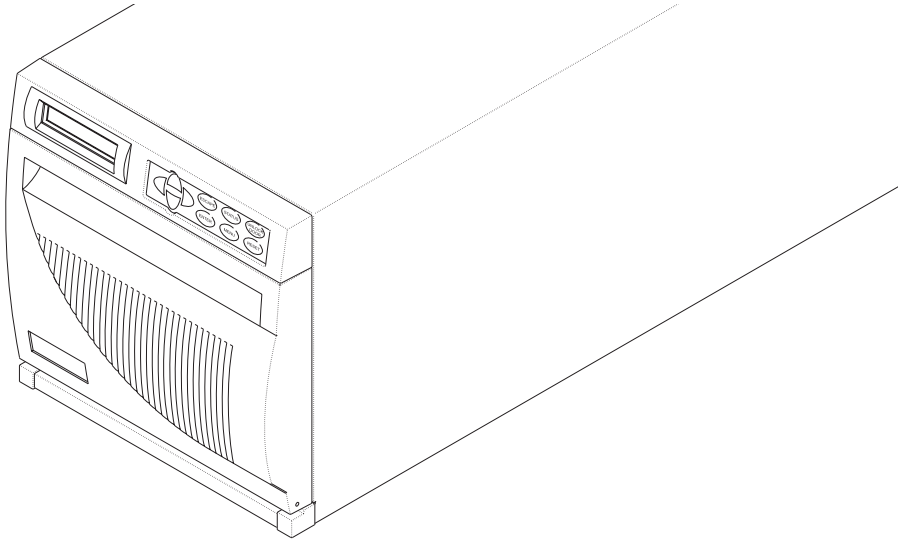
Warning Read text marked by the "WARNING" icon for information you must know to avoid personal injury.

NOTES

1

PRODUCT OVERVIEW

Congratulations on selecting the Exabyte® 110L LTO™ Ultrium™ tape autoloader. Your new autoloader provides unattended data storage, archiving, backup, and retrieval for a wide range of systems, from small PC workgroups to midrange networks. The 110L autoloader is available with either an LTO Ultrium 1, Ultrium 2, or Ultrium 3 tape drive.



AUTOLOADER FEATURES

The Exabyte 110L autoloader includes the following features:

- **Storage for up to 10 data cartridges.** Cartridges are stored in one removable cartridge magazine containing seven slots and three additional cartridge slots mounted to the left of the tape drive. The removable magazine is easily accessible from the front panel and can be used with an interlocking lid to store cartridges outside of the autoloader.
- **LTO Ultrium tape drive.** The tape drive is installed in a drive carrier that allows easy installation and removal from the autoloader.
- **Robotic cartridge handler (robot).** The robot moves cartridges between storage slots and the tape drive.

- **Optional bar code scanner.** On some autoloader models, the robot includes a bar code scanner that can read labels on cartridges. The autoloader stores the bar code information as part of its cartridge inventory.

- **Operator panel with LCD display.** The operator panel allows you to monitor autoloader operations, select configuration options, and control the robot from the front panel.

- **Wide, low-voltage differential (LVD) SCSI interface.** The autoloader and LTO Ultrium tape drive each support independent sets of SCSI messages and commands and can be connected to separate LVD SCSI buses.

- **Optional Ethernet port for connection to a 10/100BaseT Ethernet network.** If your autoloader is equipped with the Ethernet option, you can connect the autoloader to an Ethernet network for remote monitoring, management, upgrading firmware, and creating diagnostic listings.

- **Built-in remote management capability.** If your autoloader is equipped with the Ethernet option, you can use the autoloader's built-in remote management utility and a standard web browser to set configuration options, view autoloader information, monitor, and manage operation over an Ethernet network.

  Note: Your autoloader may include Exabyte Library Monitor software on CD. Exabyte Library Monitor is an older program for remote monitoring that has been replaced by the autoloader's built-in Remote Management utility. The Remote Management utility is available with the latest firmware on autoloaders that include the Ethernet option. You can download the latest firmware from Exabyte's web site (www.exabyte.com). Instructions for upgrading autoloader firmware are provided on page 124.

- **Standalone or rack-mount configuration.** The autoloader is designed to operate as a standalone unit or in a standard 19-inch rack. If desired, you can mount two Exabyte 110L autoloaders side-by-side on a single rack shelf. Rack-mounting kits are available from Exabyte.

AUTOLOADER COMPONENTS

The following sections describe the autoloader's front panel, internal, and back panel components.

FRONT PANEL COMPONENTS

Figure 1-1 shows the autoloader's front panel components.

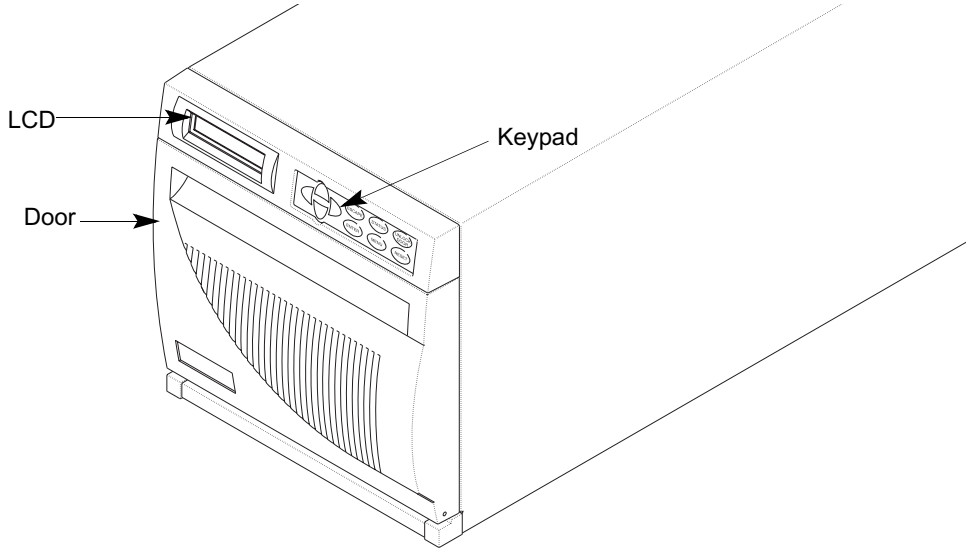


Figure 1-1 *Front panel components*

Operator Panel (LCD and Keypad) The operator panel includes a keypad and a two-line, 32-character liquid crystal display (LCD). You can use the operator panel to perform the following activities:

- View autoloader and tape drive status and information
- Set or change autoloader configuration options
- Unlock the door
- Run demonstration programs and test autoloader operations
- Reset the autoloader and tape drive

Door The door allows manual access to the autoloader's internal components, including the tape drive and cartridges. To help maintain cartridge security and to provide safety from possible laser beam exposure, the door is secured by a solenoid-activated electronic locking system. The autoloader will not operate when the door is unlocked.

INTERNAL COMPONENTS

Figure 1-2 shows the autoloader's internal components.

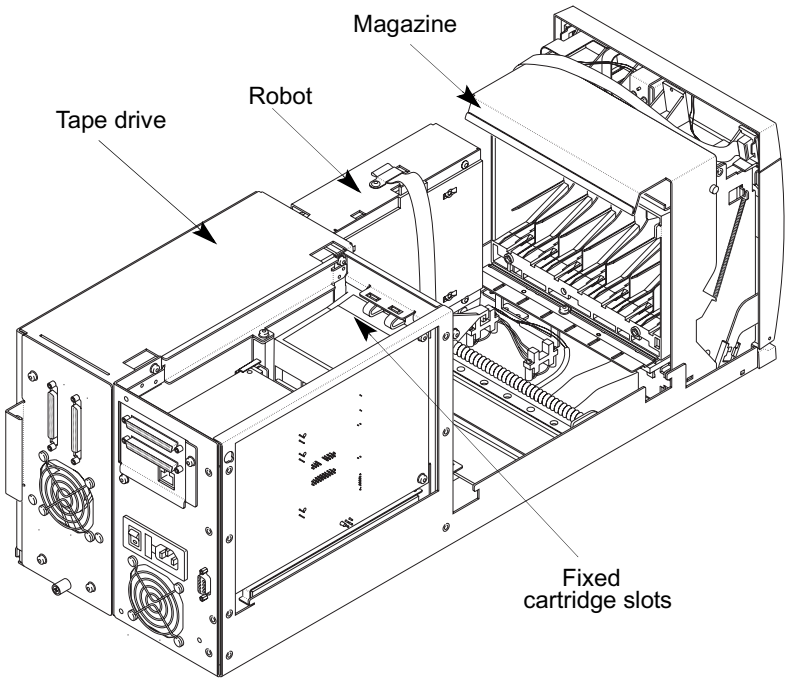


Figure 1-2 *Internal components*

LTO Ultrium Tape Drive The autoloader contains one LTO Ultrium tape drive. As shown in Figure 1-3, the tape drive is installed in a drive carrier to allow it to be easily inserted and removed from the autoloader. When you remove the data cartridge magazine from the front of the autoloader, you can access the tape drive to manually load or remove a cartridge.

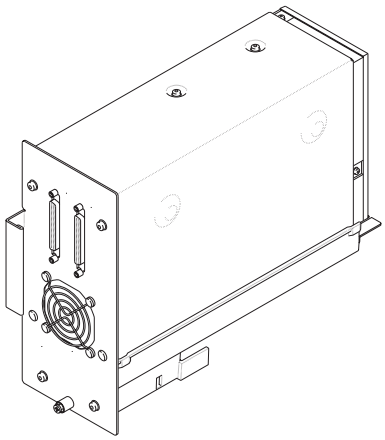


Figure 1-3 *LTO Ultrium tape drive installed in a drive carrier*

Table 1-1 shows the data transfer rates and capacities for each generation of LTO Ultrium tape drive.

Table 1-1 *LTO Ultrium tape drive transfer rates and capacities*

Tape Drive	Maximum Data Transfer Rate (2:1 Compression)	Maximum Data Capacity (2:1 Compression)
LTO Ultrium 1	15 MB per second (108 GB per hour)	200 GB on one Ultrium 1 cartridge
LTO Ultrium 2	35 MB per second (252 GB per hour)	400 GB on one Ultrium 2 cartridge
LTO Ultrium 3	80 MB per second (576 GB per hour)	800 GB on one Ultrium 3 cartridge

Robot The robot picks and places cartridges, moving them between the cartridge slots and tape drive. An optional laser bar code scanner attached to the robot reads bar code labels on the cartridges, enabling the autoloader to maintain cartridge inventory information.

Cartridge magazine The autoloader has a removable cartridge magazine containing seven slots. The magazine slots incorporate design features to ensure that the cartridges are always inserted correctly and to prevent the cartridges from falling out of the magazine.

The magazine, shown in Figure 1-4, has alignment guides on the top and mounting slots on the bottom. These features align with guides on the magazine holder to ensure secure and accurate positioning of the magazine inside the autoloader.

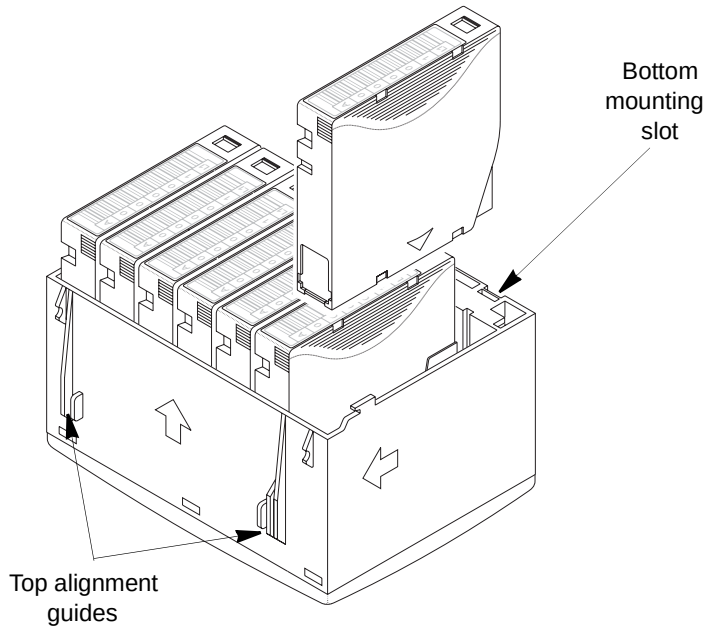


Figure 1-4 *Data cartridge magazine*

Fixed Cartridge Slots The autoloader contains three fixed cartridge slots located to the left of the tape drive. If desired, you can configure the fixed cartridge slot closest to the tape drive to hold a cleaning cartridge.

BACK PANEL COMPONENTS

Figure 1-5 shows the autoloader's back panel components.

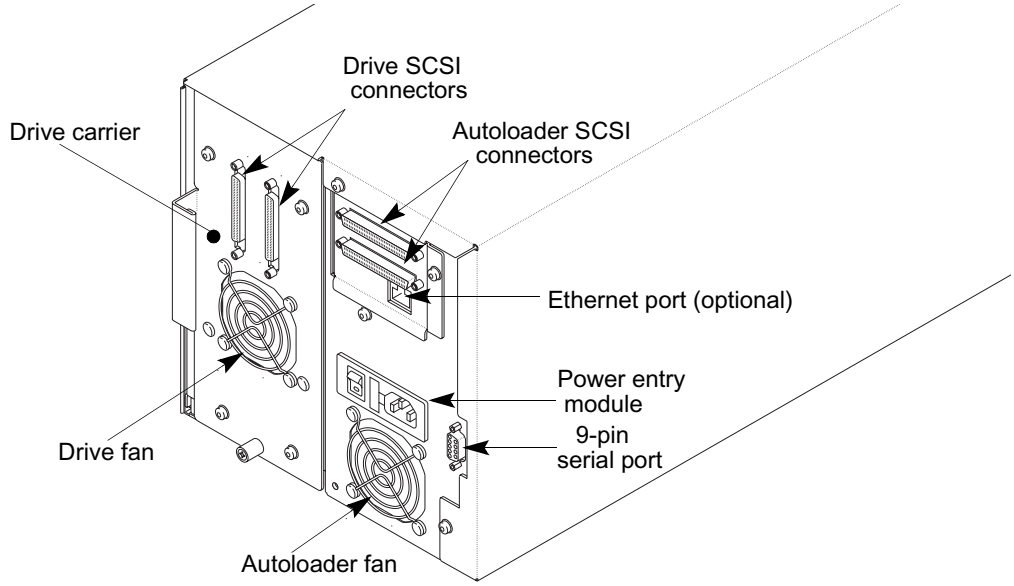


Figure 1-5 *Back panel components*

Drive Carrier The autoloader contains one LTO Ultrium tape drive installed in an Exabyte drive carrier. The drive carrier includes two SCSI connectors for connecting the tape drive to a SCSI bus. The drive carrier allows the tape drive to be easily inserted and removed from the autoloader. The drive carrier includes a fan to maintain the operating temperature of the tape drive.

Autoloader SCSI Connectors The autoloader has two 68-pin, wide LVD SCSI connectors for connection to a SCSI bus. The connectors accommodate either two SCSI cables or a cable and an external terminator. The autoloader can be on the same bus as the tape drive or on a separate bus.

Ethernet Port (Optional) The optional Ethernet port allows you to connect the autoloader to a 10/100BaseT Ethernet network. You can use the Ethernet connection to perform the following activities:

- Monitor and manage autoloader operation remotely
- Down diagnostic information from the autoloader
- Upgrade the autoloader's firmware

9-Pin Serial Port A 9-pin serial port allows the autoloader to be connected directly to a computer for diagnostics and firmware upgrades.

Power Entry Module The autoloader chassis is grounded through the power entry module. The module includes the power cord connection and the power switch. The power cord connection provides AC power to the internal power supply for the autoloader and the tape drive. The power switch allows you to turn power on and off for the autoloader and the enclosed tape drive.

Fans The system fan provides cooling for the autoloader. The drive carrier also includes a fan to provide optimal cooling for the enclosed tape drive.

NOTES

2

INSTALLING THE AUTOLOADER

This chapter describes how to install the autoloader hardware. Installation involves the following steps:

- Unpacking the autoloader
- Obtaining accessories and equipment
- Preparing for installation
- Installing the autoloader in a rack (optional)
- Preparing and installing cartridges
- Connecting the autoloader to SCSI
- Connecting the autoloader to Ethernet (optional)
- Powering on the autoloader
- Verifying the hardware installation

UNPACKING THE AUTOLOADER

No special tools are required for unpacking the autoloader. Save all the original packing materials, including the accessory box, in case you need to ship or move the autoloader later. To unpack the autoloader:

1. Remove the autoloader from the packing materials.
2. Grasp the autoloader's door at the top and pull it open, as shown in Figure 2-1.

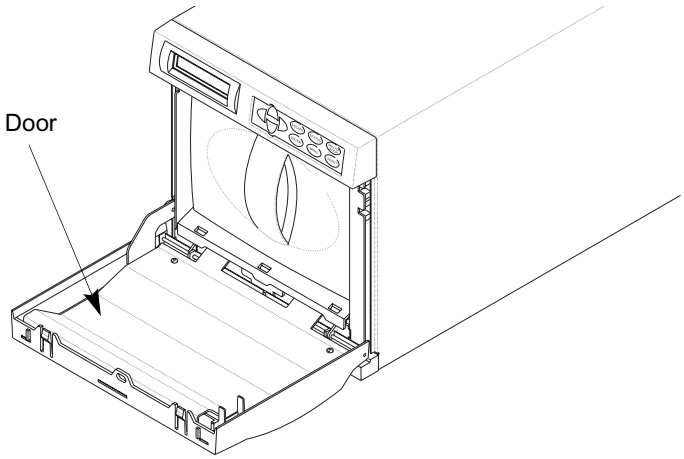


Figure 2-1 *Opening the autoloader's door*

3. From inside the door, remove the magazine by grasping the handle, shown in Figure 2-2, and pulling the magazine straight out.
4. Remove the robot shipping brace from the magazine, as shown in Figure 2-2.

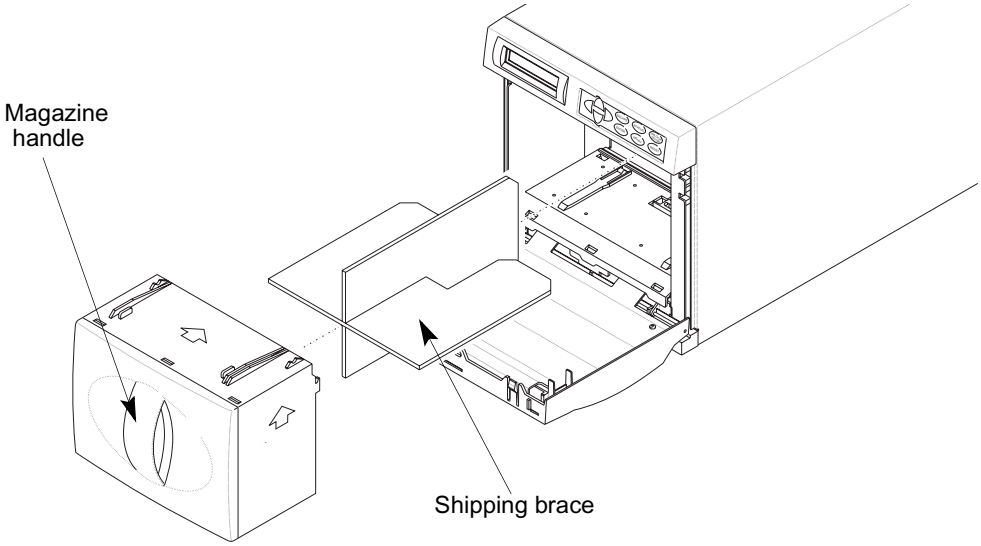


Figure 2-2 *Removing the robot shipping brace*

OBTAINING ACCESSORIES AND EQUIPMENT

Make sure that you have all the accessories and equipment for autoloader operation, as indicated in Table 2-1. Many of these items are included in the autoloader accessory box. If necessary, you can purchase items from Exabyte (see page iv).

Table 2-1 *Accessories and equipment for installation and operation*

Accessories and Equipment	
Power Cord	Two power cords may be provided with the autoloader: one for use in the US and Canada and one for use in Europe. If you plan to use the autoloader outside of these locations, refer to page 153 for power cord requirements.
SCSI Cables	Two SCSI cables are provided with the autoloader: one for connecting a host computer to the autoloader, and one for connecting the autoloader to the tape drive. You may need additional cables if the autoloader is not at the end of a SCSI bus or if you plan to attach two SCSI buses to the autoloader. You can purchase SCSI cables from Exabyte or provide your own. If you want to use your own cables, follow these guidelines: ▪ Use wide LVD SCSI cables that conform to SCSI-3 specifications. To comply with the regulations and standards listed in Appendix A, all SCSI cables used with the autoloader must be properly shielded. ▪ The maximum allowable length of an LVD SCSI bus is 12 meters (39 feet) if you have more than two devices on the bus. To determine the bus length: **a.** Add together the lengths of all external SCSI cables on the bus. **b.** Add 20 centimeters (8 inches) for the internal cable length used by the tape drive and 5 centimeters (2 inches) for the internal cable length used by the robot. **c.** Add the internal cable lengths for any other SCSI devices on the bus.
SCSI Bus Terminator(s)	One SCSI terminator is provided with the autoloader. You may need an additional terminator if you have two SCSI buses attached to the autoloader. You can purchase terminators from Exabyte or provide your own. If you want to use your own terminators, use active terminators such as the AMP 796051-1 (SE/LVD Multi-mode) SCSI terminator. Termination must be external; do not use internal terminators.
Ethernet Cable (Optional)	For autoloaders that are equipped with the Ethernet option, a shielded Ethernet cable is provided. You can use this cable to connect the autoloader to an Ethernet network for remote monitoring, management, firmware upgrades, and diagnostics. If you want to provide your own Ethernet cable, use a shielded Category 5 (10/100BaseT connection) data-grade cable or similar Category 5 cable that is compliant with EIA/TIA 568. The autoloader's Ethernet port connector is a pin-through-hole RJ-45 shielded connector. To comply with the regulations and standards listed in Appendix A, all Ethernet cables used with the autoloader must be properly shielded.

Table 2-1 *Accessories and equipment for installation and operation (continued)*

Accessories and Equipment	
Serial Cable (Optional)	If you want to connect to the autoloader's Console interface for firmware upgrades and diagnostics, use a straight-through 9-pin serial cable (not a null modem cable).
Bar Code Labels (Optional)	For autoloaders equipped with a bar code scanner, sample bar code labels are included. If you want to prepare your own labels, refer to the *Exabyte Bar Code Label Specification for LTO Ultrium Cartridges* on the documentation CD.
Cartridges	One or more data cartridges and a cleaning cartridge may be included. Use only data and cleaning cartridges designed specifically for LTO Ultrium tape drives: ▪ The LTO Ultrium 1 tape drive uses Ultrium 1 data cartridges, which are black (100 GB, native). ▪ The LTO-2 tape drive supports Ultrium 1 data cartridges and Ultrium 2 data cartridges, which are purple (200 GB, native). ▪ The LTO-3 tape drive supports Ultrium 3 data cartridges, which are slate blue (400 GB, native). It can also read and write Ultrium 2 cartridges and read Ultrium 1 cartridges. ▪ LTO Ultrium cleaning cartridges. For maximum capacity, use Ultrium 2 data cartridges with the LTO-2 tape drive and Ultrium 3 data cartridges with the LTO-3 tape drive. You can purchase LTO Ultrium ExaPaks (7 data cartridges in a cartridge magazine) from Exabyte.
Rack-Mount Hardware (Optional)	If you want to install the autoloader in a rack, contact Exabyte for the rack-mount kit.

PREPARING FOR INSTALLATION

Before you begin installing the autoloader, do the following:

- **Make sure that the SCSI host bus adapter card installed in the host computer, any necessary device drivers, and your backup software are compatible with the autoloader.** Compatibility information is available at www.exabyte.com. If your software application has not yet been certified for the 110L autoloader, you can use one of the autoloader's emulation modes (see page 35). You can install the software on the host computer before or after autoloader installation. However, if you install the software first, you may need to reconfigure it for use with the autoloader after autoloader installation is complete.

- **Plan the SCSI bus connections for the autoloader and make sure you have the necessary SCSI cables and terminators.** The autoloader includes two SCSI devices: the autoloader itself and the tape drive. If desired, you can connect each device to a different SCSI bus. Before beginning installation, determine how many SCSI buses you will connect to the autoloader and which bus you will connect to which device (see page 17 for guidelines). Obtain the required SCSI cables and terminators for these connections.

- **Locate an appropriate area for the autoloader.** The autoloader must be operated on a level surface. There must be approximately 15 cm (6 inches) of open area behind the autoloader for adequate air flow.
- **Ensure that the work area is free from conditions that could cause electrostatic discharge (ESD).** Discharge static electricity from your body by touching a known grounded surface, such as a computer's metal chassis.

Warning Before performing any installation or maintenance procedures, be sure that the autoloader's power switch is off and that the power cord is disconnected from the autoloader and the outlet.

INSTALLING THE AUTOLOADER IN A RACK

The autoloader is designed to operate as a standalone unit or in a standard 19-inch rack. If you plan to use the autoloader in a rack and have obtained the rack-mount kit from Exabyte, install the autoloader in the rack using the instructions provided in the kit.

Note: If desired, you can mount two 110L autoloaders side-by-side on a single rack shelf.

PREPARING AND INSTALLING CARTRIDGES

Be sure to use the appropriate cartridges for the tape drive. Table 2-2 shows the cartridge and write/read compatibility for the LTO Ultrium tape drive in the autoloader.

Table 2-2 *Tape drive cartridge read/write compatibility*

LTO Ultrium Tape Drive	Ultrium 3 (slate blue)		Ultrium 2 (purple)		Ultrium 1 (black)		LTO Ultrium cleaning cartridge
	Read	Write	Read	Write	Read	Write	
LTO-3	✔	✔	✔	✔	✔	No	✔
LTO-2	No	No	✔	✔	✔	✔	✔
LTO-1	No	No	No	No	✔	✔	✔

For maximum capacity, use Ultrium 2 cartridges with the Ultrium 2 tape drive and Ultrium 3 data cartridges with the Ultrium 3 tape drive.

PREPARING CARTRIDGES

1. If your autoloader includes a bar code scanner, you can affix bar code labels to the cartridges. Position each label in the indented area on the cartridge, as shown in Figure 2-3.

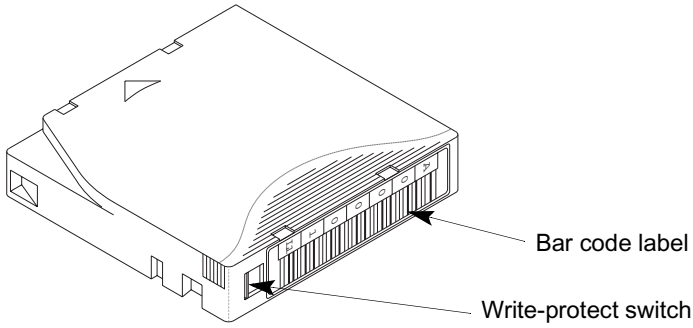


Figure 2-3 *Bar code label placement and write-protect switch location*

2. Make sure the write-protect switch on each cartridge is set for the desired operation. Refer to your cartridge packaging for instructions for setting the write-protect switch.

INSTALLING CARTRIDGES IN THE FIXED SLOTS

1. Open the autoloader's door, as shown on page 10.
2. Remove the magazine to access the fixed slots. Grasp the handle and pull straight out (see page 10).
3. Install cartridges into the fixed slots, with the write-protect switches down and facing out, as shown in Figure 2-4.

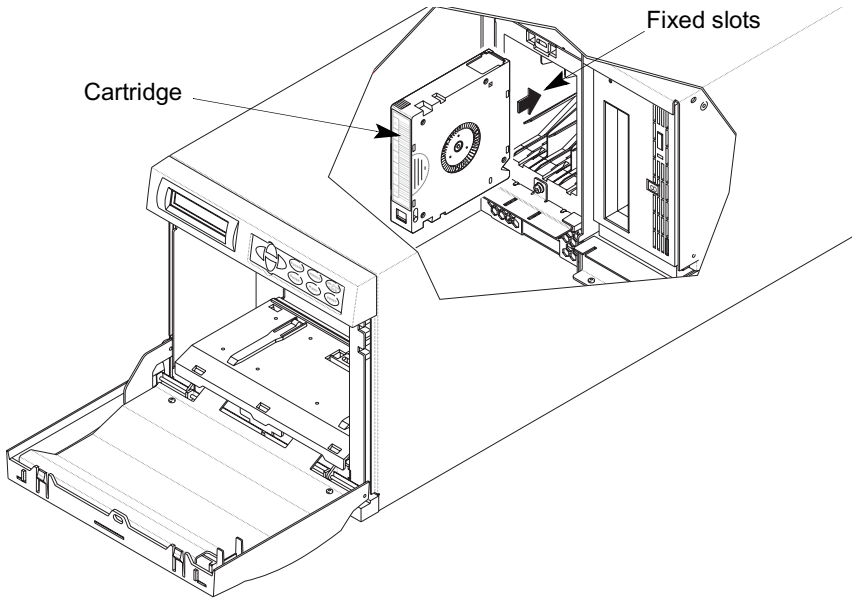


Figure 2-4 *Installing cartridges in the fixed slots*

Note: If your software license limits the number of cartridge slots you can use, you may need to configure the autoloader to use less than 10 slots (see page 40).

4. If you plan to use a separate cleaning cartridge to clean the tape drive, place the cleaning cartridge in the fixed slot closest to the tape drive, as shown in Figure 2-5. To use this slot for a cleaning cartridge, you must set the Clean Slot option during autoloader configuration (described on page 36).

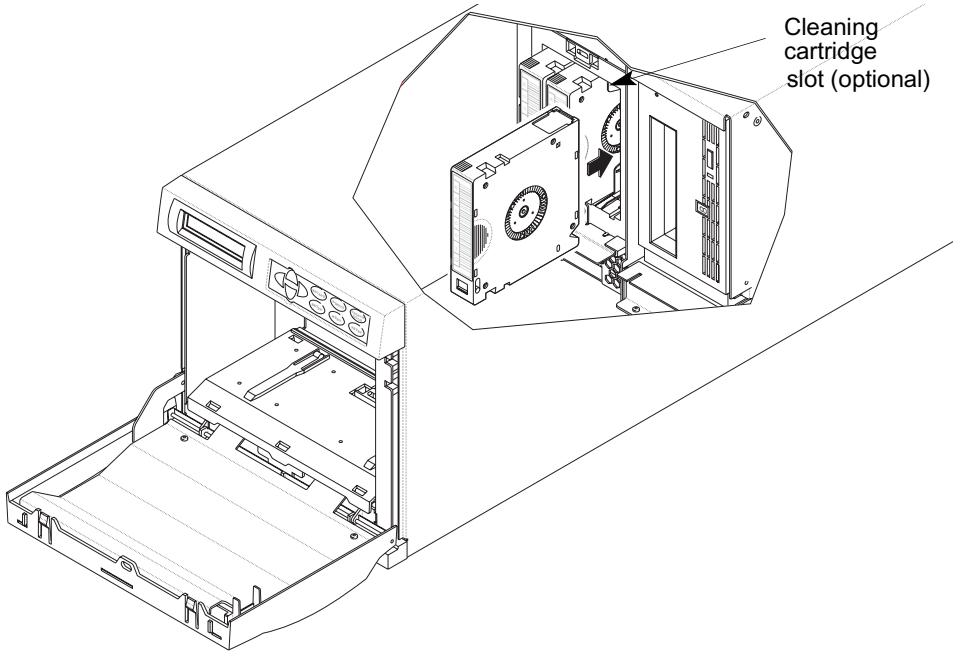


Figure 2-5 *Installing a cleaning cartridge*

Note: If you are using a cleaning cartridge and also set the Max Addressable Slot option (see page 40) to less than 10 slots, place the cleaning cartridge in the highest addressable slot. For example, if you configure the autoloader to use 8 slots, place the cleaning cartridge in slot 8. See page 58 for the cartridge numbering scheme.

Caution Do not use cleaning cartridges other than those approved for LTO Ultrium tape drives. Using other types of cleaning cartridges will void your warranty.

Carefully follow all instructions and recommendations provided with the cleaning cartridge.

INSTALLING CARTRIDGES IN THE MAGAZINE

1. Install cartridges in the magazine so that the write-protect switches are positioned away from the alignment guides, as shown in Figure 2-6.

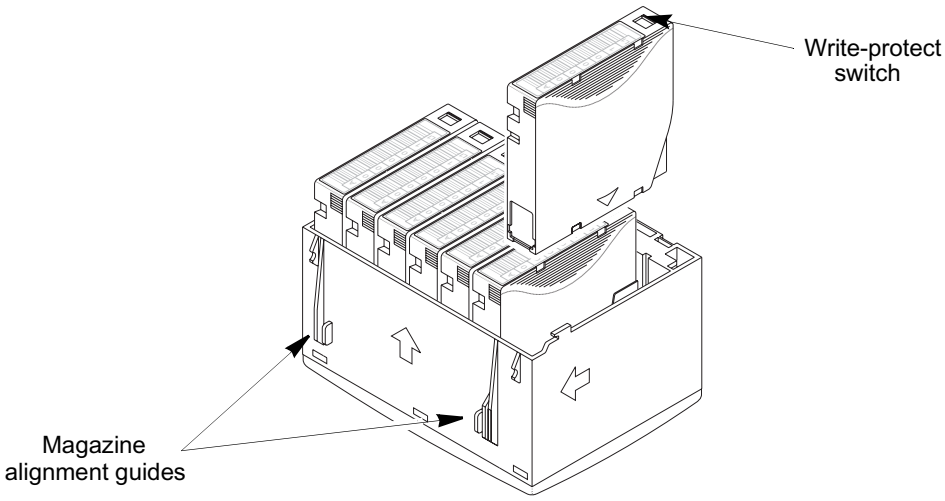


Figure 2-6 *Installing cartridges in the magazine*

2. Insert the cartridge magazine into the autoloader so that the alignment guides are up (as shown in Figure 2-7) and the alignment grooves are down. The magazine can only be inserted one way; do not try to force it into the autoloader.

! **Important** The magazine fits only one way; do not try to force it into the autoloader. If the magazine does not slide in easily, check its orientation and re-insert it.

---

3. Close the autoloader's door.

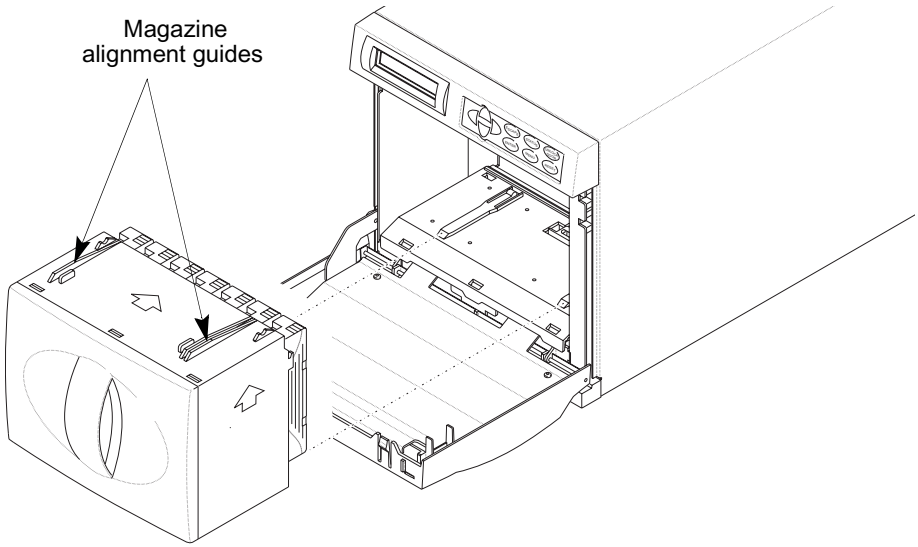


Figure 2-7 *Installing the magazine in the autoloader*

CONNECTING THE AUTOLOADER TO SCSI

This section provides guidelines for connecting the autoloader to a host system via SCSI. The 110L autoloader and its tape drive have independent wide LVD (low-voltage differential) Ultra2 or Ultra3 (Ultra160) SCSI interfaces and can be connected to a single or separate SCSI buses.

Note: To ensure optimum tape drive performance, connect the tape drive to an Ultra3 (Ultra160) SCSI host bus adapter.

GUIDELINES FOR CONNECTING TO SCSI

Before connecting the autoloader and its tape drive to SCSI, determine how many SCSI buses you will be using, which bus will connect to which device, and how many cables and terminators you will require. Keep in mind these guidelines as you plan your SCSI connections:

- **Do not connect single-ended SCSI devices.** Although single-ended SCSI is compatible with LVD Ultra2 and Ultra3 SCSI, Exabyte does not support single-ended devices on the SCSI buses used for the autoloader or its tape drive.
- **Do not connect the autoloader to a RAID controller.** The autoloader will not operate if it is connected to a RAID controller.
- **Do not exceed SCSI bus length restrictions.** The maximum allowable length of an LVD SCSI bus is 12 meters (39 feet) if you have more than two devices on the bus. Make sure that the buses attached to the autoloader and its tape drive do not exceed this length. To determine the length of each bus:
  a. Add together the lengths of all external SCSI cables on the bus.
  b. For the bus attached to the tape drive, add 20 centimeters (8 inches) for the internal cable length used by the tape drive.
  c. For the bus attached to the autoloader, add 5 centimeters (2 inches) for the internal cable length used by the autoloader.
  d. Add the internal cable lengths for any other SCSI devices on the bus.
- **Make sure each SCSI bus is properly terminated.** You must install a terminator on the device at the physical end of each bus. Typically, the autoloader's tape drive will terminate the bus. See page 11 for terminator requirements.

MAKING THE SCSI CONNECTIONS

To connect the autoloader and its tape drive to SCSI:

1. Make sure that the autoloader is powered off.
2. Power off the host computer and any peripheral devices on the SCSI buses.
3. Connect a SCSI cable to the host and to one of the autoloader's SCSI connectors, shown in Figure 2-8.

! **Important** Do not over-tighten the SCSI cable jack screws.

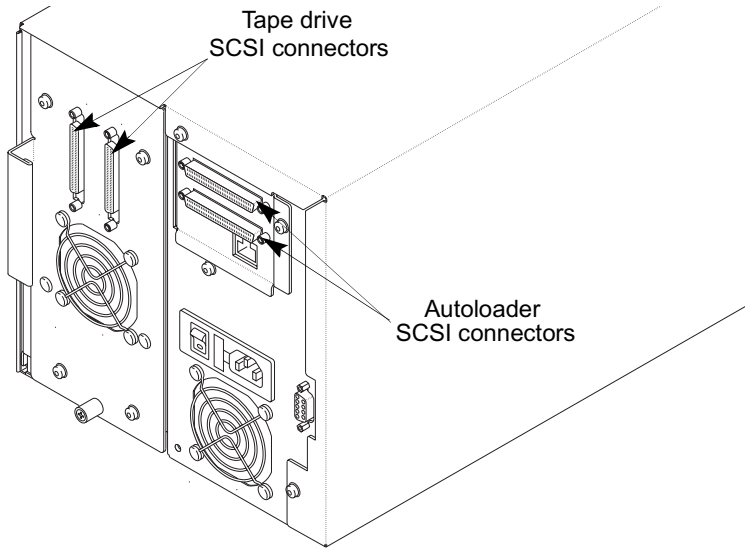


Figure 2-8 *Location of autoloader and tape drive SCSI connectors*

4. Connect other SCSI cables, as necessary, depending on your bus configuration. If the autoloader and tape drive will share one bus, use a jumper cable to connect them, as shown in Figure 2-9.
5. For the device at the physical end of a bus, install a terminator on one of the SCSI connectors for that device.

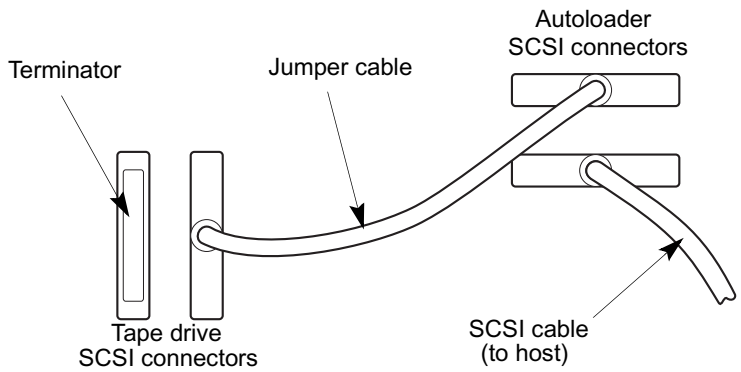


Figure 2-9 *Cabling for a shared SCSI bus*

6. Power on all of the peripheral devices on the SCSI bus(es).

7. Power on the autoloader as described on page 20.

CONNECTING THE AUTOLOADER TO ETHERNET (OPTIONAL)

If your autoloader is equipped with the Ethernet option, you can connect the autoloader to an Ethernet network to remotely monitor and manage operation, create diagnostic listings, and upgrade firmware. You can use the autoloader's built-in remote management utility and a standard web browser to remotely configure, monitor, and manage the autoloader (see Chapter 6). For information about upgrading firmware and creating diagnostic listings, see page 124.

Note: Your autoloader may include Exabyte Library Monitor software on CD. Exabyte Library Monitor is an older program for remote monitoring that has been replaced by the autoloader's built-in Remote Management utility, described in Chapter 6. The Remote Management utility is available with the latest firmware on autoloaders that include the Ethernet option. You can download the latest firmware from Exabyte's web site (www.exabyte.com). Instructions for upgrading autoloader firmware are provided on page 124.

To connect the autoloader to Ethernet using the provided cable:

1. Insert one end of the cable into the autoloader's Ethernet port until you hear it snap into place. The Ethernet port is located on the back of the autoloader, as shown in Figure 2-10.

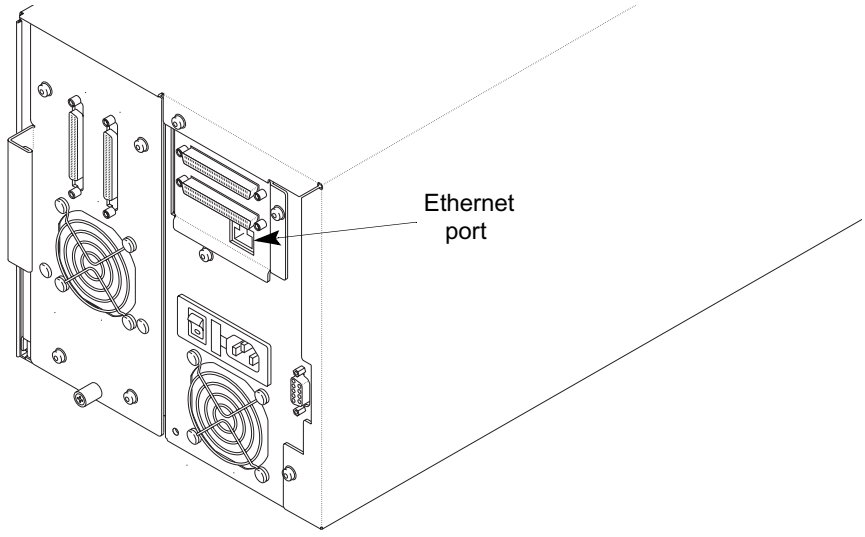


Figure 2-10 *Location of Ethernet port*

2. Connect the other end of the cable to the network or directly to the server you plan to use to monitor the autoloader or upload firmware.

When you perform autoloader configuration, you will configure the autoloader's Ethernet interface (see page 31).

POWERING ON THE AUTOLOADER

To power on the autoloader:

1. Make sure that the power switch on the back of the autoloader, shown in Figure 2-11, is off (the **0** is pressed).

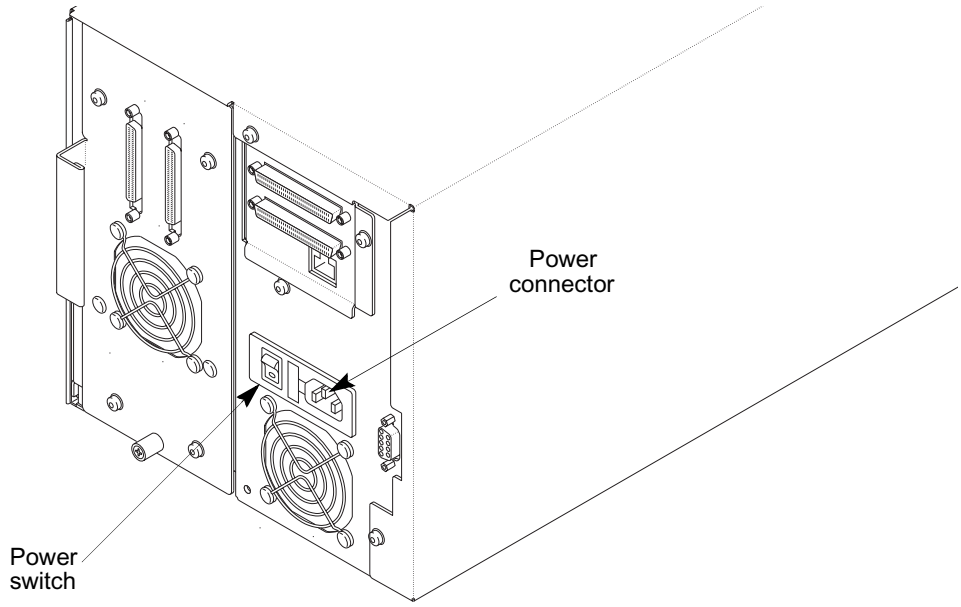


Figure 2-11 *Location of the autoloader's power connector and power switch*

2. Connect the female end of the power cord to the power connector on the back of the autoloader.

! **Important** Two power cords are shipped with the autoloader: One for use in the US and Canada, and one for use in Europe. Use the correct power cord for your location. See page 153 for power cord requirements for other locations.

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3. Plug the male end of the power cord into the power source.

   Note: The autoloader has autoranging voltage selection, so you do not need to change the voltage setting.

4. Make sure the autoloader's door is closed.

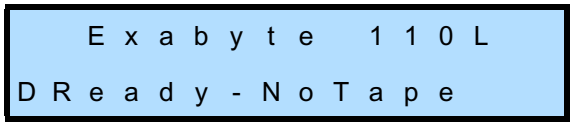
5. Push the power switch on the back of the autoloader to the on position (the **I** is pressed). The autoloader performs its power-on sequence. During this time, the cooling fans begin to operate, the LCD illuminates, and the tape drive and autoloader perform power-on self-tests.

6. Power on the host computer system.

> ! **Important** Do not power on the host computer system immediately after powering on the autoloader. After you press the autoloader's power switch, there is a short delay before the tape drive is on-line.

VERIFYING THE HARDWARE INSTALLATION

After the autoloader powers on, the LCD displays the Status Screen. As shown in the example below, the first line of the Status Screen displays the product name and the second line shows status for the drive (ready, no tape loaded).



If the autoloader powered on as described above, continue with autoloader configuration in Chapter 3.

If the autoloader did not power on as described above, check the following:

- Is the power switch on?
- Is the power cord inserted correctly?
- Is the autoloader's door closed?
- Is the SCSI bus terminated?
- Are the SCSI cables firmly connected to the autoloader, tape drive, and host computer?
- Are the devices on each SCSI bus attached to the autoloader all LVD?
- Is the host computer system turned on?
- Is there an error code displayed on the autoloader's LCD? (See Chapter 8 for an explanation of the LCD error codes.)

If you cannot resolve the problem yourself, contact Exabyte Technical Support (see page iv).

NOTES

3

CONFIGURING THE AUTOLOADER

After installing the autoloader hardware, you are ready to set configuration options. This chapter describes how to:

- Access configuration options
- Set configuration options
- Check the setup

ACCESSING CONFIGURATION OPTIONS

With the 110L autoloader, you use the operator panel to access configuration options, or, if your autoloader is equipped with the Ethernet option, you can use the autoloader's web-based remote management utility. If you plan to use the remote management utility, refer to Chapter 6 for information about accessing the utility and instructions for setting configuration options through the utility.

USING THE OPERATOR PANEL

The autoloader's operator panel includes a two-line LCD and keypad (see Figure 3-1) that allow you to interactively control autoloader operations. Using the operator panel, you can set autoloader options, check operating statistics, and diagnose errors.

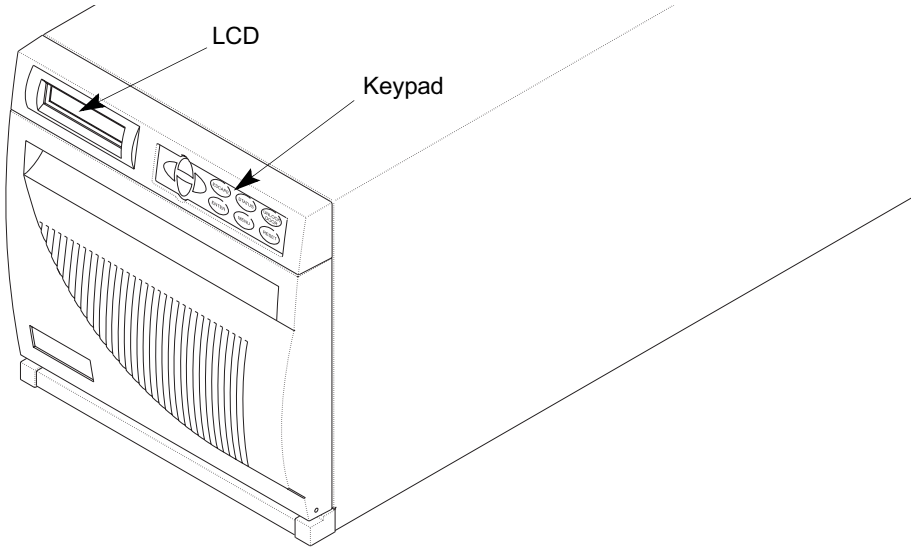


Figure 3-1 *Autoloader LCD and keypad*

Viewing the Status Screen

During normal operation, the Status screen appears on the LCD (see the example below). You can use this screen to monitor autoloader activities. By default, the Status screen displays the current operating status of the autoloader and tape drive.

```
    E x a b y t e   1 1 0 L
D R e a d y - N o T a p e
```

If a hardware error occurs, an error code appears on the Status screen. Refer to Chapter 8 for help in diagnosing and correcting errors. You must correct the error before operation can continue.

Using the Operator Panel Keys

Use the operator keys described in Table 3-1 to perform the following actions:

Table 3-1 *Operator key descriptions*

Key	Action
(Arrow keys)	Move up, down, left, or right through the menus and screens.
ESCAPE	Return to the previous menu or screen, or cancel an operation without saving changes.
ENTER	Select the item next to the screen arrow or accept a change.
STATUS	Display the Status screen, which shows autoloader status, tape drive status, and operator messages.
MENU	Display a menu of options for configuring the autoloader, viewing information screens, and issuing commands to the autoloader.
UNLOCK DOOR	Stop robot operations and release the door's interlock mechanism. The door can then be opened manually.
RESET	Reset the autoloader and tape drive.

OVERVIEW OF AUTOLOADER MENUS

To access the autoloader's menus, press MENU on the keypad. The first menu to appear is "Cartridge Inventory." Press the up and down arrow keys to loop through the menu options.

If a menu contains a triangle symbol (▸), you can either press ENTER to access another screen or menu, or you can change values using the operator keys. A square symbol (■) indicates that the screen contains viewable information only.

Figure 3-1 shows the organization of the operator panel menus.

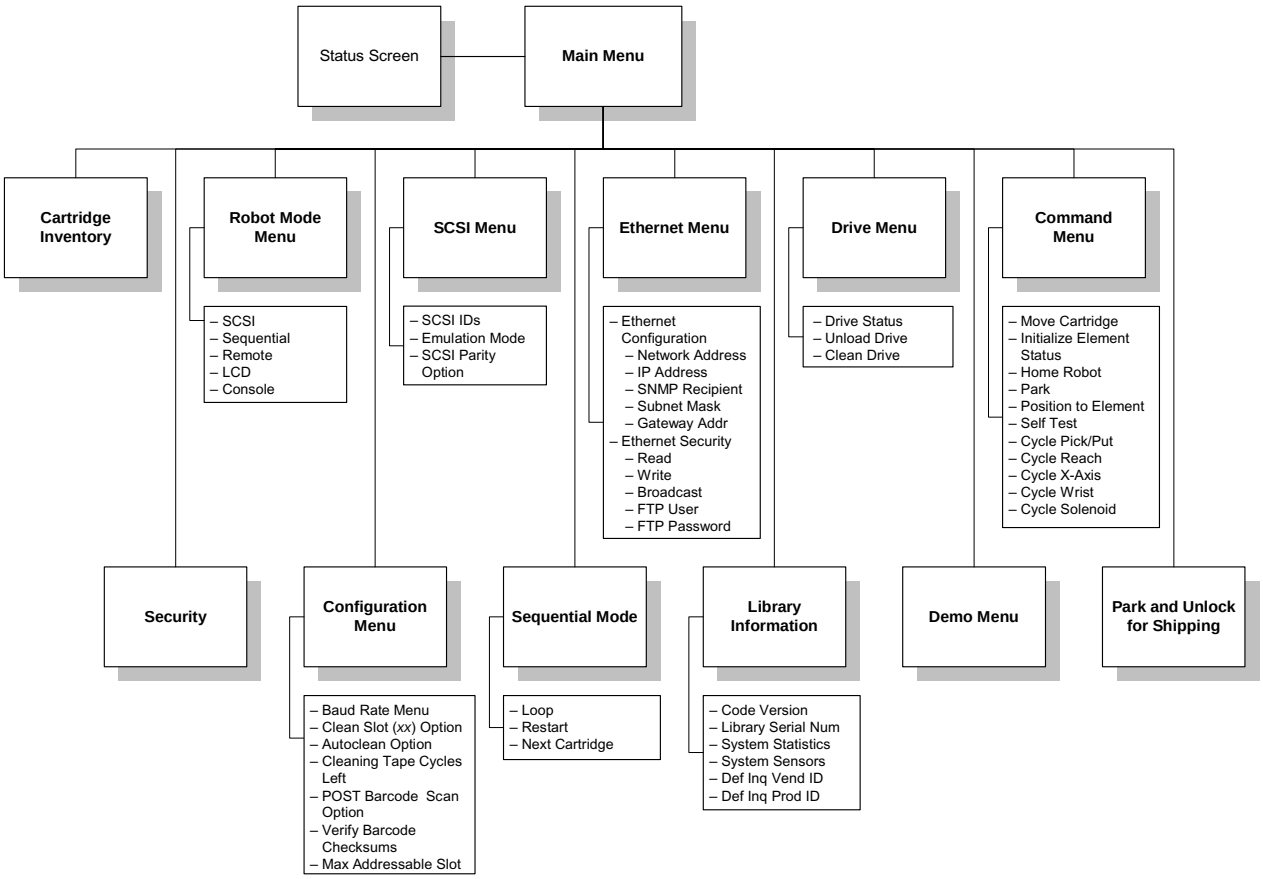


Figure 3-2 *Autoloader menu structure*

Table 3-2 provides an overview of the menu options.

Table 3-2 *Autoloader menu options*

Menu Option	Description
Cartridge Inventory	Displays the current inventory information for each autoloader element.
Security	Indicates whether options can be changed from the operator panel and allows you to enable or disable security with a password.
Robot Mode Menu	Displays the current robot control mode (SCSI, Sequential, Remote, LCD, or Console) and allows you to change the mode.
Configuration Menu	Displays the current baud rate setting for the serial port and allows you to change the baud rate, reserve the last cartridge slot for use with a cleaning cartridge, enable Autoclean, choose whether the autoloader scans the cartridge bar code labels during POST, choose whether bar code label checksums are verified, and set the maximum number of cartridge slots the autoloader uses.
SCSI Menu	Displays the SCSI IDs for the autoloader and tape drive. Allows you to set the SCSI IDs, emulation mode, and SCSI parity checking.

Table 3-2 *Autoloader menu options (continued)*

Menu Option	Description
Sequential Mode	Allows you to specify how the autoloader functions when it operates in sequential mode.
Ethernet Menu	Displays the current network addressing method, IP address, SNMP recipient address, gateway address, and Ethernet security information. Allows you to change the autoloader's FTP password and configure the autoloader for operation on an Ethernet network. **Note:** This menu appears only if the Ethernet option is installed.
Library Information	Displays information about the autoloader's code versions, serial number, system statistics, system sensors, and INQUIRY data.
Drive Menu	Displays the status of the tape drive and allows you to issue commands to unload a cartridge from the drive or clean the drive.
Demo Menu	Allows you to run various demonstration programs to observe how the autoloader operates.
Command Menu	Allows you to issue commands for basic robot motion operations and perform diagnostic tests.
Park and Unlock for Shipping	Moves the robot to the park position for shipping and unlocks the door.

SETTING CONFIGURATION OPTIONS

This section provides step-by-step instructions for setting autoloader configuration options. The instructions assume that you are using the operator panel to set options. If you are using the autoloader's remote management utility (described in Chapter 6), the selections are generally the same, but you access menus and selections through web-style links and fields.

Table 3-3 provides an overview of each configuration option. Read through the table to determine which options you need to set, then follow the steps on the referenced pages.

Table 3-3 *Autoloader configuration options*

Configuration Option	Description	See...
SCSI Configuration		
SCSI IDs	Setting SCSI IDs is required for autoloader operation. View the default settings and change them if necessary.	"Setting SCSI Configuration Options" on page 29
SCSI Parity	By default, parity checking is enabled. If desired, you can disable parity checking for the autoloader if the SCSI adapter card connected to the autoloader does not support parity checking.	

Table 3-3 *Autoloader configuration options (continued)*

Configuration Option	Description	See...
Ethernet Configuration		
Ethernet Addresses	If your autoloader is equipped with the Ethernet option, you can set the autoloader's IP address, SNMP recipient address, subnet mask, and gateway address for communication across an Ethernet network. You can also choose whether the autoloader uses a fixed IP address (static addressing) or an address assigned by a DHCP server.	"Setting Ethernet Configuration Options" on page 31
Ethernet Security	If you need to identify the autoloader's SNMP settings to a network-based monitoring application, you can view the autoloader's Read, Write, and Broadcast community access strings. If desired, you can change these settings from their default values. You can also view and set the autoloader's FTP user name and password used for transferring firmware files and creating diagnostic listings.	
Emulation		
Emulation Mode	Setting an emulation mode is required if your application software does not support a 110L, but does support an Exabyte 210, 430, or 480 library.	"Changing the Emulation Mode" on page 35
Automatic Tape Drive Cleaning		
Cleaning Slot Cleaning Cycles Autoclean	These options allow you to set up automatic tape drive cleaning. **Note:** To use automatic cleaning, a cleaning cartridge must be installed (see page 15).	"Setting up Automatic Tape Drive Cleaning" on page 36
Bar Code Scanning		
POST Bar Code Scan	You can set this option to cause the autoloader to automatically scan all bar code labels whenever the door is opened and closed or the autoloader is powered on. By default, this option is turned off. **Note:** If your autoloader does not include a bar code scanner, the LCD shows "N/A" after this option.	"Setting Bar Code Scanning Options" on page 38
Verify Barcode Checksums	This option instructs the autoloader to verify checksums on bar code labels. By default, this option is turned off. **Note:** If your autoloader does not include a bar code scanner, the LCD shows "N/A" after this option.	
Number of Slots Used		
Max Addressable Slot	This option allows you to configure the autoloader so that it uses and reports fewer slots than are physically present. You can set this option if your software application bases licensing on the number of slots being used and you are using fewer than the full number of slots in the autoloader. If your software does not monitor the number of slots, you do not need to set this option. By default, the autoloader reports 10 slots.	"Limiting the Number of Slots Used (Max Addressable Slot Option)" on page 40

Table 3-3 *Autoloader configuration options (continued)*

Configuration Option	Description	See...
Security		
LCD Security	By setting LCD security, you prevent unauthorized personnel from disrupting the operation of the autoloader through the operator panel.	"Setting up Autoloader Security" on page 41

SETTING SCSI CONFIGURATION OPTIONS

This section describes how to:

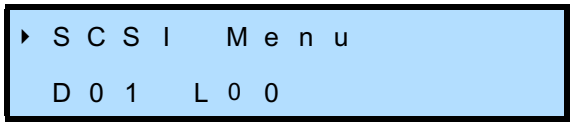
- Set SCSI IDs for the autoloader and tape drive
- Set SCSI parity checking

Setting the SCSI IDs

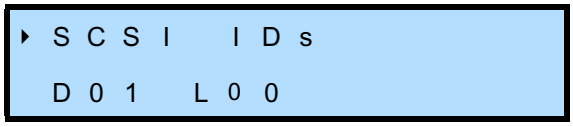
The autoloader and its tape drive are independent SCSI devices that can be attached to the same SCSI bus or to separate SCSI buses. Each device attached to a SCSI bus must have a unique SCSI ID within that bus. Because you may have multiple buses, the autoloader does not check for duplicate SCSI IDs. Make sure you do not assign duplicate IDs within a bus.

To view and change the SCSI IDs:

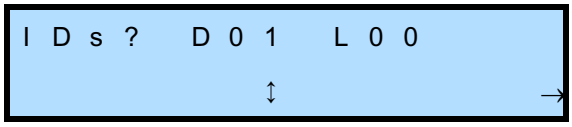
1. If the security option has been enabled, disable it (see page 42).
2. Press MENU to display the menus. The first menu item to appear is "Cartridge Inventory."
3. Press the down arrow key until "SCSI Menu" appears. The SCSI Menu screen shows the current ID settings. In the example below, the tape drive (D) is set to 01 and the autoloader (L) is set to 00.



4. If you want to change the settings, press ENTER. The SCSI IDs screen appears.



5. Press ENTER again to display the next screen for changing the IDs.



6. To select the drive or autoloader, use the left and right arrow keys to move the screen arrow (↕) to the appropriate column. To change the ID, use the up and down arrow keys to scroll through values.

7. When you have set the SCSI IDs, press ENTER to save your changes. The screen displays a status message for the drive ID you changed. When the autoloader has finished changing the IDs, the SCSI IDs screen displays the new settings.

Setting the SCSI Parity Option

By default, the autoloader checks all data coming across the SCSI bus for parity. If desired, you can disable parity checking for the autoloader if the SCSI adapter card connected to the autoloader does not support parity checking. The parity setting remains in effect across power cycles.

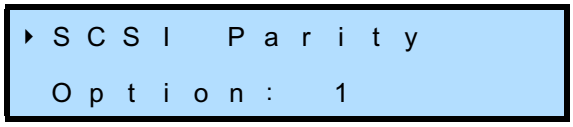
Note: Parity checking for the autoloader can also be enabled through the application software. The method used last to set parity checking (operator panel or software) has precedence. Parity checking for the tape drive is set separately.

To set parity checking:

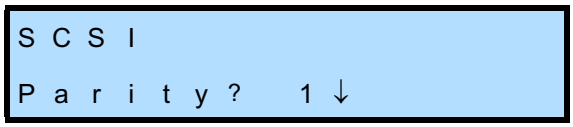
1. If the security option has been enabled, disable it (see page 42).

2. Press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "SCSI Menu" appears on the screen, then press ENTER.

3. Press the down arrow key until "SCSI Parity" appears, as shown below. This screen shows whether parity is enabled (1) or disabled (0).



4. Press ENTER. The following screen appears.



5. Use the up or down arrow key to select "1" to turn parity checking on or "0" to turn parity checking off, then press ENTER. The screen shows the new setting.

SETTING ETHERNET CONFIGURATION OPTIONS

If your autoloader includes the Ethernet option, you can connect to the autoloader's Ethernet interface to remotely monitor and manage operation, upgrade firmware, and create diagnostic listings. Instructions for connecting the autoloader to Ethernet are provided on page 19. For information about using the autoloader's remote management utility, see Chapter 6.

Configuring the autoloader's Ethernet interface typically involves specifying the autoloader's IP address, subnet mask, and gateway address. The IP address is used to route information from the autoloader to the server. You can choose between dynamic (server-assigned) or static (user-assigned) addressing for the IP address. The subnet mask is used to route information to designated devices within the network. The gateway address allows information to be routed outside the subnet. You can also view and set the autoloader's SNMP (Simple Network Management Protocol) recipient IP address.

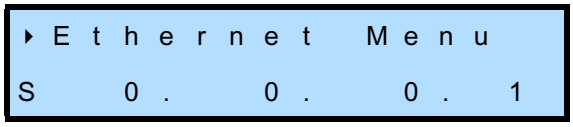
If you are using a network-based monitor/management application other than the autoloader's remote management utility, you may need to identify the autoloader's SNMP settings to the application. These settings include the read, write, and broadcast community strings. You can view these settings on the Ethernet Security screens, but you cannot change their values from the operator panel. If you need to change the values for these strings, you can use the autoloader's Console interface. See page 125 for information about connecting to the Console interface.

The autoloader also includes an FTP interface that you can use to transfer firmware files or create diagnostic listings. You can set up an FTP user name and password for this interface or use the autoloader's defaults. See page 130 for instructions for accessing the autoloader's FTP interface and using an FTP utility to upgrade firmware or obtain diagnostic listings.

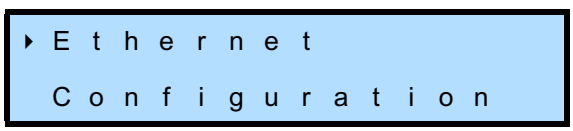
Setting the Ethernet Addresses

To set the Ethernet addresses:

1. If the security option has been enabled, disable it (see page 42).
2. Press MENU to display the menus. Press the down arrow key until "Ethernet Menu" appears.



3. Press ENTER. The Ethernet Configuration menu appears.



4. Press ENTER. The Network Address screen appears.

There are five screens for setting Ethernet addresses: Network Address, IP Address, SNMP Recipient, Subnet Mask, and Gateway Address. Press the down arrow key to view each screen. The options are described in Table 3-4.

Table 3-4 *Ethernet address configuration options*

Ethernet Address Option	Description
Network address	Selects the method used to set the Internet Protocol (IP) address for the autoloader, as follows: ▪ Static – The autoloader uses a fixed IP Address, which is assigned in the IP Address option, described below. ▪ DHCP – The autoloader uses an IP address assigned by the network DHCP (Dynamic Host Configuration Protocol) server. Static addressing is recommended. Dynamic assignment of the autoloader's IP address may require periodic reinstallation or reconfiguration of some monitoring software applications.
IP Address	Sets the IP address for the autoloader or displays the IP address obtained by the DHCP server.
SNMP Recipient	Sets the IP address for the SNMP trap recipient.
Subnet Mask	Sets the subnet mask for the autoloader. **Note:** This option displays "N/A" if the network address is set to DHCP.
Gateway Address	Sets the default TCP/IP (Transmission Control Protocol/Internet Protocol) gateway address for the autoloader. **Note:** This option displays "N/A" if the network address is set to DHCP.

5. At each screen, press ENTER to display another screen for setting values. To change addresses, use the left and right arrow keys to move the screen arrow (↕) across columns until it is under a digit you want to change. Use the up and down arrow keys to scroll through values. When you have finished changing all of the desired values, press ENTER to save your changes.

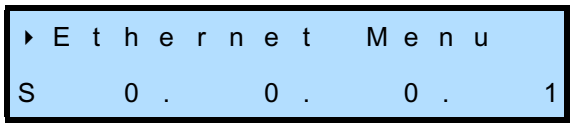
Viewing the SNMP Settings, FTP User Name, and FTP Password

The Ethernet Security screens allow you to view the read-only values for the autoloader's Read, Write, and Broadcast community access strings. You can also view and change the autoloader's FTP user name and password.

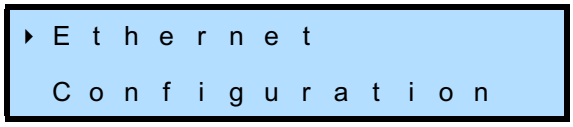
To view the Ethernet security screens:

1. If the security option has been enabled, disable it (see page 42).

2. Press MENU to display the menus. Press the down arrow key until "Ethernet Menu" appears.

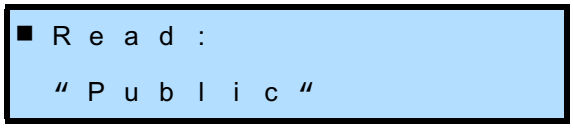


3. Press ENTER. The Ethernet Configuration menu appears.



4. Press the down arrow key until "Ethernet Security" appears.

5. Press ENTER. The first screen to appear is shown below.



There are five Ethernet security screens: Read, Write, Bcast (Broadcast), FTP User, and FTP User PW. Press the down arrow key to view each screen. The screens are described in Table 3-5.

Note: If security is enabled (either from the LCD or SCSI), these options display asterisks (****).

Table 3-5 *Ethernet security screens*

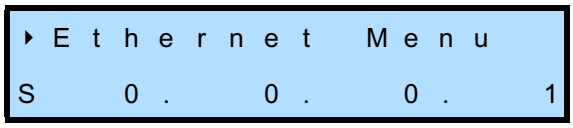
Ethernet Security	Description
Read	Displays the autoloader's alphanumeric Read community string. The default is *public*.
Write	Displays the autoloader's alphanumeric Write community string. The default is *public*.
Bcast (Broadcast)	Displays the autoloader's alphanumeric Broadcast community string. The default is *public*.
FTP User	Displays the autoloader's FTP user name, up to 16 characters. The default is *anonymous*.
FTP PW (Password)	Displays the autoloader's FTP password, up to 16 characters. The default is *Exabyte*.

Changing the FTP User Name and Password

To change the autoloader's FTP user name and password:

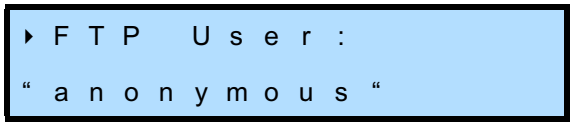
1. If the security option has been enabled, disable it (see page 42).

2. Press MENU to display the menus. Press the down arrow key until "Ethernet Menu" appears.

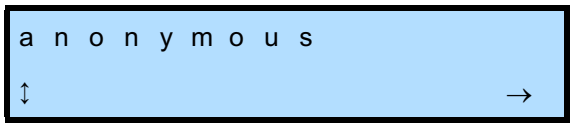


3. Press ENTER. Press the down arrow key until "Ethernet Security" appears.

4. Press ENTER. Press the down arrow key until the FTP User screen appears. "Anonymous" is the default FTP user name for the autoloader.

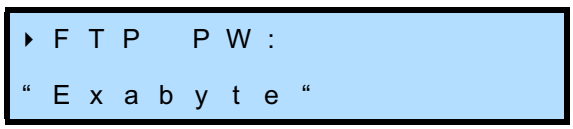


5. Press ENTER to display the screen for changing the user name.



6. Use the left and right arrow keys to move the screen arrow (↕) across columns until it is under a character you want to change. Use the up and down arrow keys to scroll through letters. You can enter a user name of up to 16 characters. When you have finished changing all of the desired characters, press ENTER to save your changes. The FTP User screen displays the new user name.

7. To change the FTP password, press the down arrow key until the FTP PW screen appears. "Exabyte" is the default FTP password for the autoloader.



8. Press ENTER to display the screen for changing the password.

9. Use the left and right arrow keys to move the screen arrow (↕) across columns until it is under a character you want to change. Use the up and down arrow keys to scroll through letters. You can enter a password of up to 16 characters. When you have finished changing all of the desired characters, press ENTER to save your changes. The FTP PW screen displays the new password.

CHANGING THE EMULATION MODE

If your software has not yet been certified for the Exabyte 110L autoloader, you can select an option that allows the autoloader to emulate an Exabyte 210, 430, or 480 library. By default, the autoloader returns "Exabyte 110L" in response to a SCSI INQUIRY command from an application. Changing the emulation mode causes the autoloader to return "EXB-210," "Exabyte 430," or "EXB-480" instead. Because most library applications are certified for these libraries, changing the emulation mode may allow these applications to support the 110L.

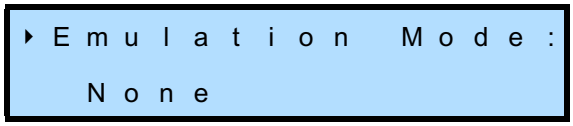
Note: If you change the emulation mode, you will need to reboot your host computer so that it recognizes the new emulation mode.

To change the emulation mode:

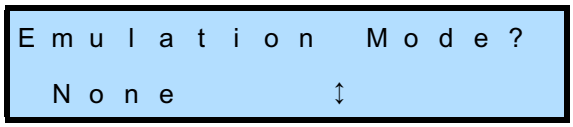
1. If the security option has been enabled, disable it (see page 42).

2. Press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "SCSI Menu" appears, then press ENTER.

3. Press the down arrow key until "Emulation Mode" appears, as shown below. This screen shows the current mode.



4. Press ENTER. The following screen appears.



5. Use the up or down arrow key to select an emulation mode, then press ENTER. Select "EXB-210" if your software supports the Exabyte 210 library; select "Exabyte 430" if your software supports the Exabyte 430; select "EXB-480" if your software supports the Exabyte 480 library.

SETTING UP AUTOMATIC TAPE DRIVE CLEANING

The Autoclean option enables the autoloader to automatically perform tape drive cleaning without operator intervention. When Autoclean is enabled, the autoloader monitors the cleaning requirements of the tape drive. When the drive indicates a "Needs Cleaning" status, the robot removes the cleaning cartridge from its slot and inserts it into the tape drive. After the cleaning cycle is complete, the robot returns the cleaning cartridge to its slot and resumes operation.

! Important If you plan to use automatic cleaning, make sure that you have installed a cleaning cartridge in the cleaning cartridge slot location (see page 15).

If your autoloader software has a cleaning option, be sure to turn that option OFF.

Note: You do not have to use the autoloader's Autoclean option to clean the tape drive. You can choose from several other cleaning methods, including using your software's cleaning function and using commands available through the operator panel. See page 53 for information about these cleaning alternatives.

Setting up automatic tape drive cleaning involves three procedures:

- Activating the cleaning slot
- Setting the number of cleaning cycles
- Enabling the Autoclean option

Activating the Cleaning Slot

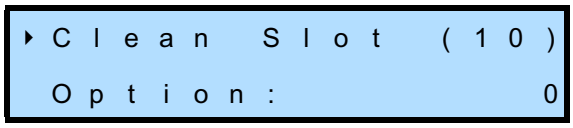
Activating the Clean Slot option designates the right-most fixed cartridge slot (closest to the tape drive) as a permanent storage location for a cleaning cartridge.

Note: If you change the Max Addressable Slot option (see page 40), the location of the cleaning slot changes. The cleaning cartridge slot, if used, is always the highest storage element address enabled. For example, if you change the Max Addressable Slot option to 8, then the cleaning slot will be 8. For more information on storage element addresses, see page 58.

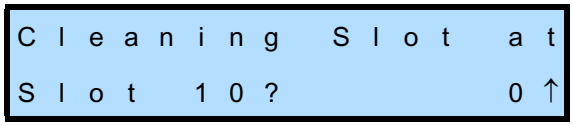
To activate the Clean Slot option:

1. If the security option has been enabled, disable it (see page 42).
2. Change the control mode to LCD (see page 46).
3. Press MENU to display the menus. Press the down arrow key until "Config Menu" appears, then press ENTER.

4. Press the down arrow key to display "Clean Slot Option," then press ENTER. The Clean Slot Option screen shows which slot is designated as the cleaning slot (10 in the example below) and whether the option is on (1) or off (0).



5. Press ENTER. The following screen appears.



6. Press the up or down arrow key to select "1" to turn the fixed cleaning slot option on or "0" to turn it off, then press ENTER. The screen shows the current selection.

Setting the Number of Cleaning Cycles

The Cleaning Tape Cycles Left option is a counter that tracks the number of times a cleaning cartridge has been used. When you install a new cleaning cartridge, you must use this option to set the number of cleaning cycles that remain. After completing a cleaning cycle, the autoloader automatically decreases the Cleaning Tape Cycles Left counter by one.

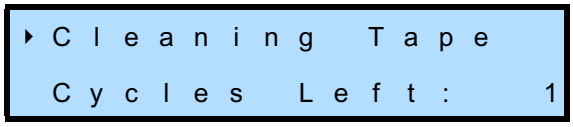
Note: Refer to the information provided with your LTO Ultrium cleaning cartridge to determine how many cleaning cycles it contains.

To set the Cleaning Tape Cycles Left option:

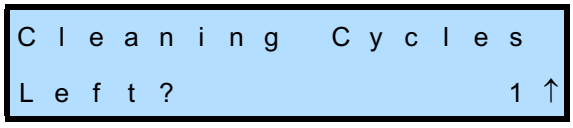
1. If the security option has been enabled, disable it (see page 42).

2. If necessary, press MENU to display the menus. Press the down arrow key until "Config Menu" appears, then press ENTER.

3. Press the down arrow key to display "Cleaning Tape Cycles Left."



4. Press ENTER. The following screen appears.

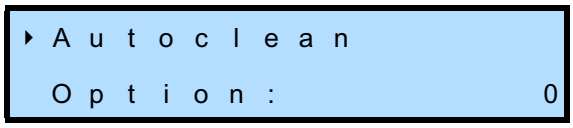


5. Use the arrow keys to set the number of cleaning cycles that remain on the installed cleaning cartridge, then press ENTER.

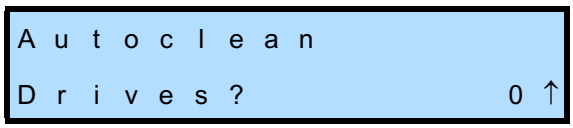
Enabling the Autoclean option

After setting up the cleaning slot and the number of cleaning cycles remaining, you can turn on autocleaning by enabling the Autoclean option:

1. If the security option has been enabled, disable it (see page 42).
2. If necessary, press MENU to display the menus. Press the down arrow key until "Config Menu" appears, then press ENTER.
3. Press the down arrow key until "Autoclean Option" appears. This screen shows whether Autoclean is enabled (1) or not (0).



4. Press ENTER. The following screen appears.



5. Press the up or down arrow key to select "1," which turns on the Autoclean option, or "0" to turn the option off, then press ENTER.

Note: When the Cleaning Tape Cycles Left counter reaches zero, the autoloader disables Autoclean and displays a message on the Status screen that reminds you to replace the cleaning tape.

SETTING BAR CODE SCANNING OPTIONS

If your autoloader is equipped with a bar code scanner and you are using bar code labels with your cartridges, you can set options that determine when the autoloader scans all of the cartridge labels and whether the autoloader verifies checksum characters on the labels.

Setting the POST Bar Code Scan Option

When the POST Bar Code Scan option is enabled, the autoloader automatically scans the bar code labels whenever the autoloader's door is opened and closed or whenever the autoloader is powered up. By default, this option is turned off. Enabling this option increases the amount of time the autoloader requires to complete POST (power-on self-test).

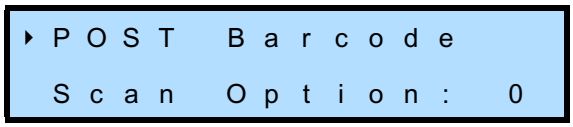
Note: If your autoloader does not include a bar code scanner, the LCD shows "N/A" after the option.

To turn on the POST Bar Code Scan option:

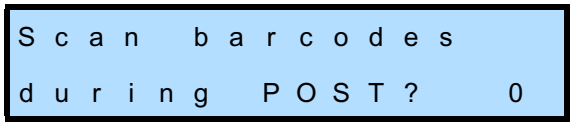
1. If the security option has been enabled, disable it (see page 42).

2. Press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Config Menu" appears, then press ENTER.

3. Press the down arrow key until "POST Bar Code Scan Option" appears. This screen shows whether bar code scanning is enabled (1) or disabled (0).



4. Press ENTER. The following screen appears.



5. Use the up or down arrow key to select "1" to turn the option on or "0" to turn the option off. Press ENTER. The screen shows the new setting.

Setting the Verify Barcode Checksums Option

If you use bar code labels that contain checksum characters, you should enable the Verify Barcode Checksums option. If you do not use bar code labels that include checksum characters or if you mix labels containing checksum characters with labels that do not, you should turn off the Verify Barcode Checksums option. By default, this option is turned off.

Note: If your autoloader does not include a bar code scanner, the LCD shows "N/A" after the option.

You can determine whether your bar code labels contain checksum characters by contacting your vendor or by following these steps:

a. Count the number of black bars on the label. (The number will be a multiple of 5.)

b. Divide this number by 5 to get the number of characters.

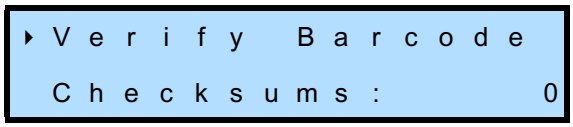
c. Subtract the number of human-readable characters on the label from the result of step b. If the result is 2, the label does not include a checksum character; if the result is 3, the label includes a checksum character.

To set the Verify Barcode Checksums option:

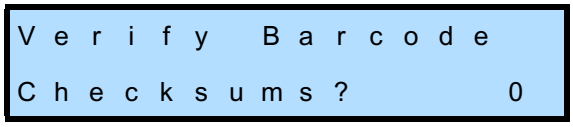
1. If the security option has been enabled, disable it (see page 42).

2. Press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Config Menu" appears on the screen, then press ENTER.

3. Press the down arrow key until "Verify Barcode Checksums" appears. This screen shows whether the option is enabled (1) or disabled (0).



4. Press ENTER. The following screen appears.



5. Use the up or down arrow key to select "1" to turn the option on or "0" to turn the option off. Press ENTER. The new setting appears on the screen.

LIMITING THE NUMBER OF SLOTS USED (MAX ADDRESSABLE SLOT OPTION)

Some applications base licensing fees on the number of cartridge slots in the autoloader. If you don't plan to use all of the slots in the autoloader, use the Max Addressable Slot option to limit the number of slots used and reported to the application. When the Max Addressable Slot is set to a value less than 10 (the default), the autoloader will not allow any commands with source or destination element addresses greater than that number.

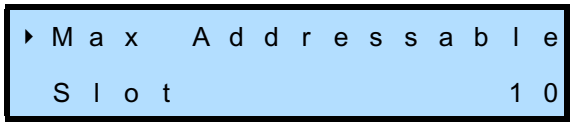
To set the Max Addressable Slot option:

1. If the security option has been enabled, disable it (see page 42).

2. Change the control mode to LCD (see page 46).

3. Press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Config Menu" appears on the screen, then press ENTER.

4. Press the down arrow until "Max Addressable Slot" appears. This screen shows the current value (10).



5. Press ENTER. The following screen appears.

6. Use the up or down arrow key to select the desired slot number, then press ENTER. The screen displays the new setting.

SETTING UP AUTOLOADER SECURITY

To prevent unauthorized users from disrupting autoloader operation, you can set up a password for accessing operator panel menus and opening the door. You can enable or disable security in either of the following ways:

- **From the operator panel (LCD security)**. You can set the security option from the LCD, as described in this section.
- **Through your autoloader application (SCSI security)**. If your application supports this feature, you can issue commands from the application to turn security on and off. Refer to your software documentation for information.

Note: Whichever method you use to enable security (operator panel or application), you must also use to disable security. That is, if you enable security from the LCD, you must disable it from the LCD. If you enable security through your application (SCSI), you must disable it through the application.

When you enable security, the following activities are prevented:

- Changing the robot control mode
- Changing configuration settings (except baud rate)
- Changing the SCSI Menu options
- Changing the Ethernet Menu options
- Cleaning the tape drive
- Using the Demo Menu
- Using the Command Menu
- Unlocking and opening the door (LCD security only)

If you attempt to perform any of these operations when security is enabled, the autoloader displays a message that states security is active.

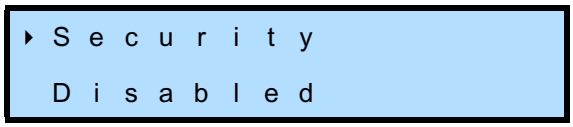
! **Important** LCD security includes prevention of access through the door. If you enable security through your application, access through the door is not prevented. Separate commands for preventing door access may be available through your application. Refer to your software documentation for information.

Note: If you are using the autoloader's remote management utility (see Chapter 6), you can set up a password in the utility to prevent unauthorized users from accessing menu items through the utility that would disrupt operation. This password is separate from the password set for LCD security.

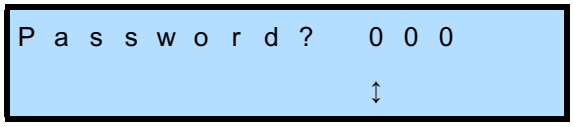
Enabling Security from the Operator Panel (LCD Security)

To enable LCD security:

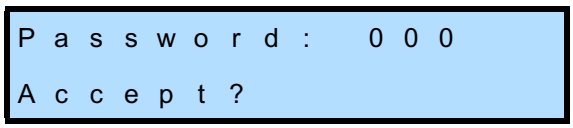
1. Press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Security" appears. This screen shows whether security is currently enabled or disabled.



2. Press ENTER. An informational message appears, then the following screen appears.



3. Use the left and right arrow keys to move across the columns. Use the up and down arrow keys to select a number. When you have selected a password, press ENTER. A prompt similar to the one below appears.



4. Press ENTER to accept the new password. The Security screen then displays "LCD Password."

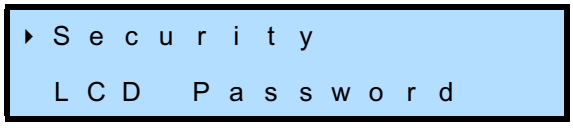
Note: Once enabled, security remains in effect through resets and power cycles.

Disabling Security from the Operator Panel

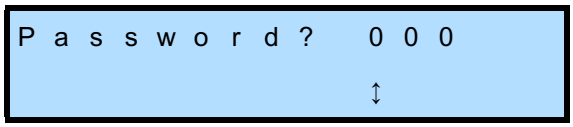
To disable LCD security:

1. Press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Security" appears. If security is enabled, "LCD Password" appears on this screen.

   Note: Security may have been enabled by your application using a SCSI command (the LCD will display "SCSI"). If this is the case, security must be disabled by your application.



2. Press ENTER. The following screen appears.



3. Enter the LCD security password set previously. Use the left and right arrow keys to move across the columns. Use the up and down arrow keys to select a number. Press ENTER. Security is disabled.

CHECKING THE SETUP

After configuring the autoloader, check the setup by performing the exercises suggested below. While these exercises are not required, it is a good idea to verify that your software and hardware are properly communicating before you begin operation.

- Use the options on the Demo Menu or Command Menu to exercise the hardware. These exercises help determine whether the autoloader hardware components are operating properly. See page 58 for instructions.

  Note: These hardware exercises require changing the control mode to LCD, as described on page 46. When you complete the exercises, be sure to change the autoloader's control mode back to SCSI, which is the standard operating mode for the autoloader.

- If you have not already done so, install the software application on the host computer. Instruct the software to perform a cartridge load and unload operation for the tape drive. This test helps determine whether the software and autoloader are communicating properly.

- Back up several megabytes of data to the tape drive and perform a comparison check on the backed-up data. This determines whether the software and tape drive are communicating properly.

If the autoloader and tape drive are not operating as expected, see Chapter 8 for troubleshooting and error code information. If you cannot resolve the problem yourself, contact Exabyte Technical Support (see page iv).

NOTES

4

OPERATING THE AUTOLOADER

After you have configured the autoloader, you can put it into operation. If you run your autoloader in SCSI mode (the default), your autoloader application controls which cartridges are moved to and from the tape drive. If you operate the autoloader in sequential mode (see page 49), the autoloader automatically processes the cartridges in sequential order. In both cases, your backup application controls backup and restore jobs in the tape drive.

Before beginning operation, always make sure that:

- The robot does not contain a cartridge.
- The cartridge magazine is installed.
- The autoloader's door is closed.
- The autoloader is in the proper control mode. SCSI is the standard operating mode (see page 46).

You can monitor autoloader operation by viewing the operator panel, or, if your autoloader is equipped with the Ethernet option, you can use the autoloader's remote management utility (see Chapter 6). The Status screen (see page 24) provides continuous updates on the activities of the autoloader and tape drive.

During normal operation, you do not need to intervene in autoloader activities. However, you may occasionally need to perform the following tasks, described in this chapter.

- Change the robot control mode
- Open the door to access cartridges or the tape drive
- Operate the autoloader in sequential mode
- Clean the tape drive
- Reset the autoloader and tape drive
- Eject a cartridge
- Perform hardware exercises
- Store cartridges that you have removed from the autoloader

CHANGING THE ROBOT CONTROL MODE

The robot control mode determines the source of commands issued to the robot to move cartridges. You can set the autoloader to one of the following control modes: SCSI, Sequential, LCD, Remote, or Console. These control modes allow you to operate the autoloader with application software (SCSI), operate the autoloader as a stacker device (Sequential), control robot motion from the operator panel (LCD), control robot motion from the remote management utility (Remote), or perform diagnostic functions (Console).

Note: Control mode settings remain through power cycles.

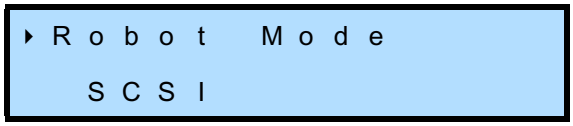
The robot control modes are described in Table 4-1.

Table 4-1 *Robot control modes*

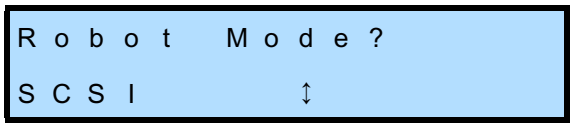
Control Mode	Description
SCSI	SCSI is the standard operating mode and the default setting for the autoloader. When the autoloader is operating in SCSI mode, the motion of the robot is controlled by application software running on the host computer. **Note:** An application can issue commands to the autoloader regardless of the control mode. However, the autoloader must be in SCSI mode for the application to control robot motion.
Sequential	In Sequential mode, no autoloader application is required to control robot motion. The autoloader's internal firmware instructs the robot to pick all cartridges sequentially, from the first cartridge in the magazine through the last cartridge in the fixed slots (or the last data cartridge slot specified by the Max Addressable Slot option, as described on page 40), and process them in the tape drive.
Remote	When the autoloader is operating in Remote mode, you control the motion of the robot by issuing commands from the autoloader's remote management utility (see Chapter 6). **Note:** You can monitor autoloader operation through the remote management utility without setting the autoloader to Remote mode. You only need to use Remote mode when you want to control robot motion from the remote management utility.
LCD	When the autoloader is operating in LCD mode, you control the motion of the robot by issuing commands through the autoloader's operator panel. You can use this mode to move cartridges and perform hardware exercises and demos. **Note:** You can use most operator panel functions without setting the autoloader to LCD mode. You only need to use LCD mode when you want to control robot motion from the operator panel.
Console	When the autoloader is operating in Console mode, robot motion is controlled from a terminal connected to the autoloader's serial port. **Note:** You do not need to switch to Console mode if you want to create diagnostic listings for technical support or upgrade firmware. For information about these tasks, see page 124.

To change the robot control mode:

1. If the security option has been enabled, disable it (see page 42).
2. Press MENU to display the menus, then press the down arrow until "Robot Mode" appears. The Robot Mode screen shows the current mode.



3. Press ENTER. An informational message appears, then the following screen appears.



4. Use the arrow keys to select the desired mode and press ENTER. The screen shows the new selection.

OPENING AND CLOSING THE AUTOLOADER'S DOOR

You can access cartridges and the tape drive by opening the autoloader's door.

Note: Whenever you open and close the door, the autoloader performs the cartridge inventory process.

Opening the Door

To open the autoloader's door:

1. If the security option has been enabled, disable it (see page 42).
2. Press the UNLOCK DOOR button. At the Unlock Door prompt, press ENTER.
3. Wait while the robot moves to the park position (at the far right).

Caution Do not force the door open. The door's interlock mechanism may be prevented from releasing by LCD security or by the application software.

4. Pull open the door, as shown in Figure 4-1.

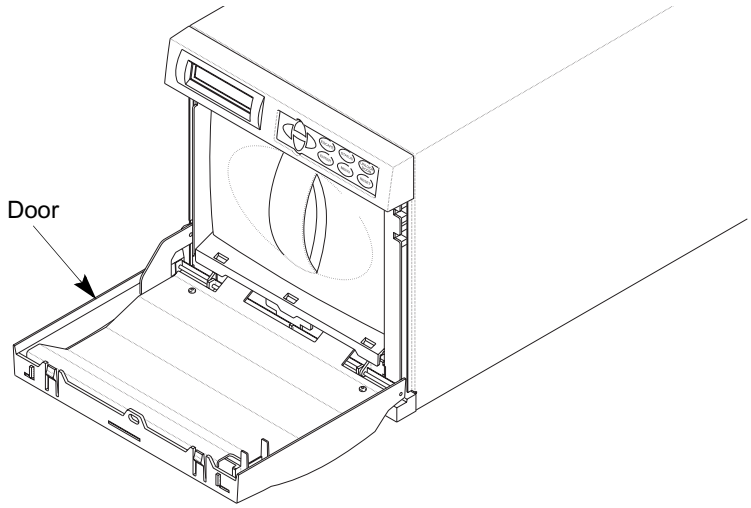


Figure 4-1 *Opening the autoloader's door*

Removing and Replacing the Magazine

To remove and replace the cartridge magazine:

1. Remove the magazine by grasping the handle and pulling it straight out, as shown in Figure 4-2.

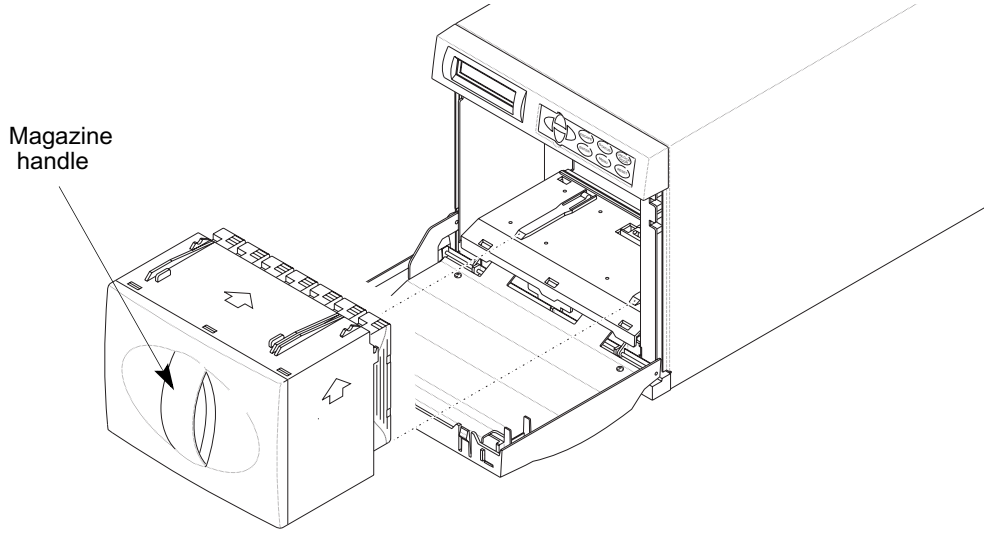


Figure 4-2 *Removing the magazine*

2. If desired, replace cartridges in the magazine and fixed slots (see page 13).

3. Insert the magazine into the autoloader so that the alignment guides are up (as shown in Figure 4-3) and the alignment grooves are down.

! **Important** The magazine fits only one way; do not try to force it into the autoloader. If the magazine does not slide in easily, check its orientation and re-insert it.

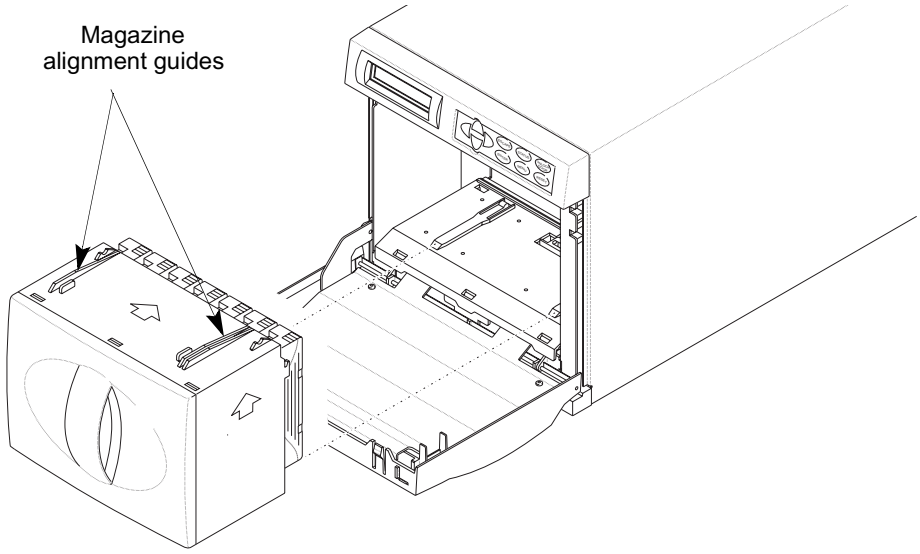


Figure 4-3 *Installing a magazine in the autoloader*

Closing the Door

To close the autoloader's door:

1. Lift up on the door to close it. Make sure it is closed completely so that the door locks can engage. The door locks automatically.

2. If necessary, re-enable security.

OPERATING THE AUTOLOADER IN SEQUENTIAL MODE

When the autoloader is operating in sequential mode, its internal firmware instructs the robot to move cartridges sequentially between the cartridge slots and the tape drive. Sequential mode is useful with software applications that support functions performed by the tape drive but not functions performed by the autoloader robotics.

In sequential mode, the autoloader performs the following steps:

1. Picks the cartridge from slot 1 and places it in the tape drive. If the slot is empty, the robot picks the next cartridge in the magazine.

2. Waits until the tape drive ejects the cartridge, then returns the cartridge to its original slot.

3. Repeats these steps for the next cartridge until it has processed all of the cartridges.

4. Returns to the first cartridge and begins the process again or stops, depending on how the Loop option, described in the following section, is set.

SEQUENTIAL MODE OPTIONS

To customize how sequential mode works, you can set the Loop, Restart, and Next Cartridge options. These options, described below, are not affected by a reset or power cycle.

Loop Option

The Loop option determines what the autoloader does after it has finished processing the last cartridge in a sequence. As shown in Table 4-2, the autoloader can either loop back to the first cartridge in the sequence and start processing the cartridges again or stop and wait for operator intervention. (Operator intervention typically means opening the autoloader's door, removing cartridges for storage, installing new cartridges, and closing the door.)

Table 4-2 *Using the Loop option to control cartridge processing during sequential operation*

If Loop is...	The Autoloader...
On	Returns to cartridge 1 and starts processing the cartridges again.
Off	Stops processing cartridges, displays a message indicating that sequential mode is done, and waits for operator intervention.

Restart Option

The Restart option determines what the autoloader does after it is reset or power cycled, or after the door is opened and closed. The autoloader can either restart at the beginning of the cartridge sequence or resume where it left off when the interruption occurred. As shown in Table 4-3, the Restart option determines what the autoloader does next.

Table 4-3 *Using the Restart option to control processing after an interruption*

If Restart is...	The Autoloader...
On	Restarts at slot 1.
Off	Resumes where it left off.

Before the Autoloader Restarts... Before restarting, the autoloader performs the following actions:

1. If the robot was moving a cartridge, it finishes the move. (This includes inserting the cartridge into the tape drive if the robot was moving a cartridge to the tape drive.)

   Note: If you attempt to open the door, the autoloader will not release the door interlock until it has completed the move.

2. The autoloader performs a power-on self-test (POST). If you opened the door, the autoloader performs its POST after you close the door.

3. If a cartridge is in the tape drive, the robot waits for the cartridge to be ejected, then returns it to its original slot.

Next Cartridge Option

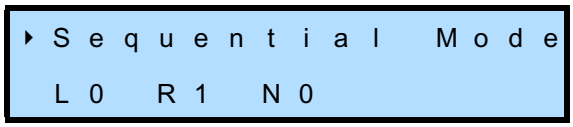
The Next Cartridge option allows you to interrupt sequential processing and specify that the next cartridge the autoloader selects is the cartridge in slot 1. If you want to stop sequential processing and resume from the first cartridge, select Next Cartridge from the Sequential Mode menu.

SETTING SEQUENTIAL MODE OPTIONS

To set sequential mode options:

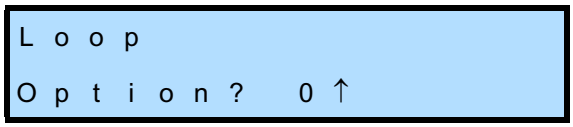
1. If the security option has been enabled, disable it (see page 42).

2. Press MENU to display the menus, then press the down arrow until "Sequential Mode" appears. The Sequential Mode screen shows the current settings for the Loop option (L), the Restart option (R), and the Next Cartridge option (N).



3. Press ENTER. The Loop Option screen appears. This screen shows whether the Loop option is on (1) or off (0).

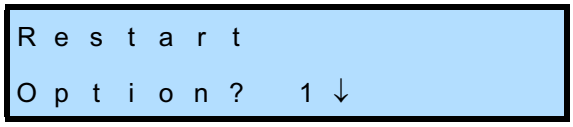
4. Press ENTER again to display the screen for changing the Loop option.



5. Use the up or down arrow key to change the setting, then press ENTER. The Loop Option screen shows the new setting.

6. Press the down arrow key to display the Restart Option screen. This screen shows whether the Restart option is on (1) or off (0).

7. Press ENTER again to display the screen for changing the Restart option.



8. Use the up or down arrow key to change the setting, then press ENTER. The Restart Option screen shows the new setting.

9. Press the down arrow key to display the Next Cartridge screen.

10. Press ENTER to set the next cartridge to 1 or ESCAPE to cancel.

11. Press ESCAPE to return to the Sequential Mode screen.

AVOIDING INTERRUPTIONS DURING SEQUENTIAL OPERATION

Although the autoloader has effective methods for resuming operation, it is best to avoid interruptions when the autoloader is operating sequentially. In particular:

- **Do not reset or power cycle the autoloader unless absolutely necessary**. Reset the autoloader only to clear certain error conditions, and power off the autoloader only to perform maintenance or to store it. Avoid resetting or power cycling the autoloader when a cartridge is in the tape drive or the robot.

- **Do not open the door unless absolutely necessary**. During operation, open the door only to replace the magazine after the autoloader has processed all the cartridges. Never force the door. The autoloader will not release the door until it has completed a cartridge move or load already in progress. Certain applications may also prevent the door from being opened.

- **Do not remove a cartridge from the tape drive or insert a cartridge into the tape drive**. If you want to remove a cartridge, wait until the robot has placed it in the magazine before removing it. If you want to add a cartridge, add it directly to the magazine.

CLEANING THE TAPE DRIVE

Under normal operating conditions, the LTO Ultrium tape drive in the autoloader does not require regular cleaning. The tape drive contains an automatic cleaning mechanism that allows it to clean itself as necessary. Occasionally, the tape drive may require cleaning with a cleaning cartridge. The tape drive monitors its cleaning needs internally and notifies the autoloader when it requires cleaning. When cleaning is required, the autoloader displays a cleaning message on the Status screen.

You can clean the tape drive in several ways:

- **Use the autoloader's Autoclean feature.** Set up automatic tape drive cleaning during autoloader configuration (see page 36) and store a cleaning cartridge in the autoloader. The Autoclean option instructs the autoloader to clean the tape drive automatically when necessary and without disrupting normal operation.
- **Use the Clean Drive option from the autoloader's operator panel.** Use the Clean Drive option (described in this section) and a cleaning cartridge stored in the autoloader to clean the drive when the autoloader or software notifies you to do so.
- **Use your software's cleaning option.** Set the cleaning option in your software application (if available) so that the software monitors drive cleaning requirements and automatically performs cleanings using a cleaning cartridge stored in the autoloader. Refer to your software documentation for information about setting up this option.

USING THE CLEAN DRIVE OPTION

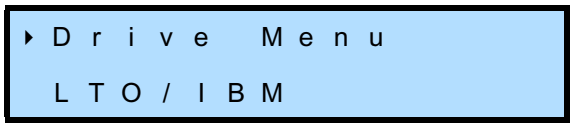
Before using the Clean Drive option, make sure that:

- A cleaning cartridge is installed in the appropriate slot (see page 15).
- You have set the Clean Slot option, which designates a permanent storage location for a cleaning cartridge. See page 36.
- You have set the Cleaning Tape Cycles Left option, which is a counter that tracks the number of times a cleaning cartridge has been used. When you install a new cleaning cartridge, you must use this option to set the number of cleaning cycles that remain. See page 37.
- You have turned the Autoclean Option off. See page 38.

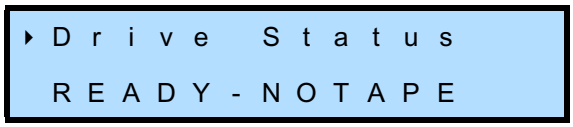
Note: The "Clean Drive" option is only available if the Clean Slot option is configured and the Cleaning Tape Cycles Left counter is greater than 0.

When the tape drive requires cleaning:

1. If security has been enabled, disable it (see page 42).
2. Change the control mode to LCD (see page 46).
3. Press MENU to display the menus. Press the down arrow key until "Drive Menu" appears.



4. Press ENTER. The Drive Status Menu appears.



5. Use the down arrow key to select "Clean Drive." Then press ENTER.

   The following activities occur:

   - The robot picks the cleaning cartridge from its slot and inserts it in the tape drive.
   - The tape drive automatically performs the cleaning process and ejects the cartridge when the process is complete (in several minutes).
   - The robot picks the cleaning cartridge from the tape drive and replaces it in its slot.

6. Confirm that the cleaning completed successfully by looking at the operator panel. The cleaning message should be gone. If the cleaning was not successful, the cleaning material in the cartridge may be expended. Replace the cleaning cartridge and clean the tape drive again.

! Important If the tape drive ejects the cleaning cartridge immediately after loading it, you need to replace the cleaning cartridge. To order cleaning cartridges, contact Exabyte (see page iv).

7. When the cleaning is complete, return the autoloader to its original control mode and re-enable security (if desired).

! Important After cleaning, the autoloader automatically decreases the Cleaning Tape Cycles Left counter. When you install a new cleaning cartridge, you must manually reset the Cleaning Tape Cycles Left counter (see page 37).

RESETTING THE AUTOLOADER AND TAPE DRIVE

If the autoloader or tape drive has encountered an error and is not operating as expected after you have tried the recommended corrective actions, you may need to reset the autoloader or tape drive. From the operator panel, you can reset the autoloader and tape drive simultaneously, or you can reset the autoloader or tape drive individually. You can also reset the autoloader and tape drive by powering the autoloader off and back on.

Note: You may also be able to perform resets from the autoloader software. Refer to your software documentation for instructions.

Resetting the autoloader causes it to perform its power-on self-test and a full cartridge inventory. If the autoloader is performing a cartridge move operation when it is reset, it completes the move operation before it performs the power-on self-test.

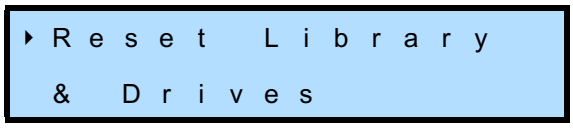
Resetting the tape drive causes the drive to perform its power-on self-test and rewind any loaded tape to the beginning.

! Important After the tape drive is reset, the drive rewinds the tape but does not eject the cartridge. Make sure that it is safe to overwrite the tape before performing a backup so that you don't lose previously recorded data. If necessary, eject the cartridge as described on page 56.

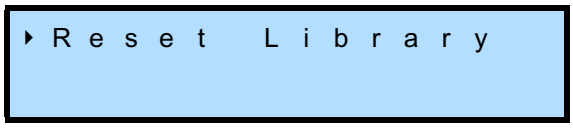
To reset the autoloader or tape drive from the operator panel:

Caution Before resetting, make sure the autoloader or tape drive are not communicating across the SCSI bus. The reset may disrupt communications on the SCSI bus.

1. Press the RESET key. The following screen appears.



If you want to reset the autoloader only, use the down arrow key to display "Reset Library," shown below.



If you wan to reset the tape drive only, use the down arrow key to display "Reset Drive 1.".

2. Press ENTER. At the confirmation prompt, press ENTER again. The autoloader performs the reset operation.

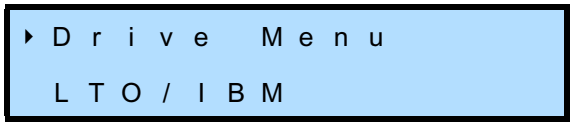
EJECTING A CARTRIDGE

If a tape drive problem occurs that requires intervention, you may need to eject a cartridge from the tape drive. You can either eject the cartridge by using the operator panel or by opening the autoloader's door and pressing the tape drive's unload button.

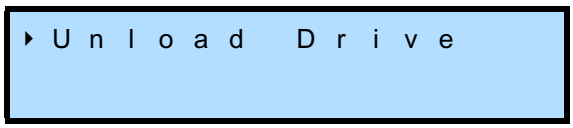
EJECTING A CARTRIDGE USING THE OPERATOR PANEL

To eject a cartridge using the operator panel:

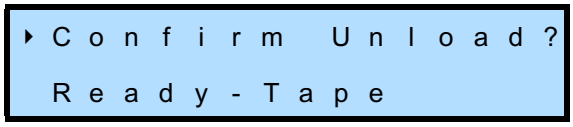
1. If the security option has been enabled, disable it (see page 42).
2. Change the control mode to LCD (see page 46).
3. Press MENU to display the menus. Press the down arrow key until "Drive Menu" appears.



4. Press ENTER. The Drive Status menu appears.
5. Use the down arrow key to select "Unload Drive."



6. Press ENTER. The following screen appears.



7. Press ENTER to eject the cartridge from the drive.

EJECTING A CARTRIDGE BY PRESSING THE UNLOAD BUTTON

To eject a cartridge by pressing the tape drive's unload button:

1. Open the autoloader's door (see page 47).
2. Remove the cartridge magazine (see page 48).

Caution Discharge static electricity from your body before touching the tape drive. Touch a known grounded surface, such as the autoloader's metal chassis.

Before pressing the unload button, make sure the tape drive is not communicating across the SCSI bus. Pressing the unload button may disrupt communications on the SCSI bus.

3. Press the unload button on the drive's faceplate, as shown by the arrow in Figure 4-4.

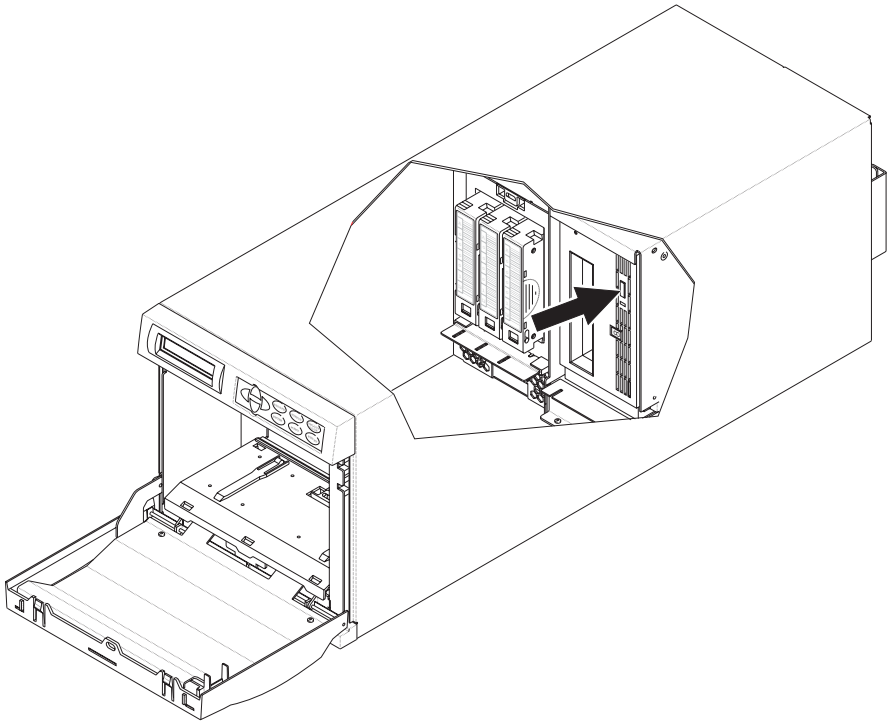


Figure 4-4 *Using the tape drive's unload button to manually eject a cartridge*

4. Remove the cartridge.
5. Replace the cartridge magazine.
6. Close the autoloader's door and re-enable security, if desired.

PERFORMING HARDWARE EXERCISES

This section describes hardware exercises you can perform from the operator panel to test autoloader functions. Hardware exercises are available from the Demo Menu and the Command Menu. The Demo Menu provides options for running the autoloader in a continuous demo mode, where the robot randomly moves cartridges between slots. The Command Menu provides options for performing specific robot movements.

Note: You can also perform hardware exercises through the autoloader's remote management utility and through the Console interface program. For information about the remote management utility, see Chapter 6. For information about Console, see page 124.

USING ELEMENT INDEXES

Elements are the physical locations in the autoloader that can accept a cartridge (the robot, the magazine slots, the fixed slots, and the tape drive).

Each element has an *element index* that enables the autoloader to identify it. Many operator panel functions require you to specify element indexes. For example, to move a cartridge, you must specify the source and destination element indexes. The source is the location from which the robot will pick the cartridge. The destination is where the robot will place the cartridge.

Figure 4-5 shows the element indexes for the autoloader.

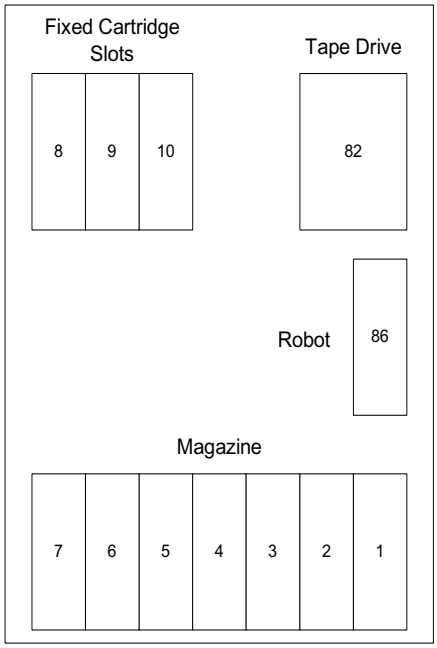


Figure 4-5 *Autoloader element index assignments*

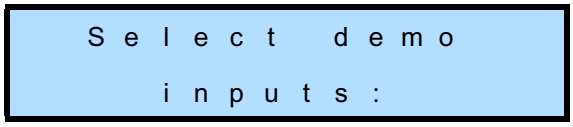
Note: Your application software may use *element addresses* to identify elements in the autoloader. The difference between an element index and an element address is that an index is a fixed number set in the autoloader's firmware, whereas an address can be changed by your application software. The autoloader's default element addresses correspond to the element indexes.

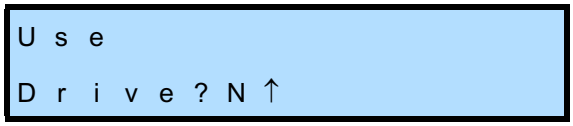
RUNNING DEMOS

To run a demo:

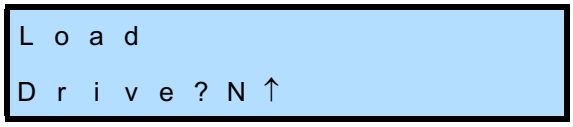
1. If necessary, disable security (see page 42).
2. Change the robot mode to LCD (see page 46).
3. Make sure there is at least one cartridge present and one empty slot before you begin the test.
4. Press MENU to display the menus. Press the down arrow key until "Demo Menu" appears.

5. Press ENTER. The following screens appear.



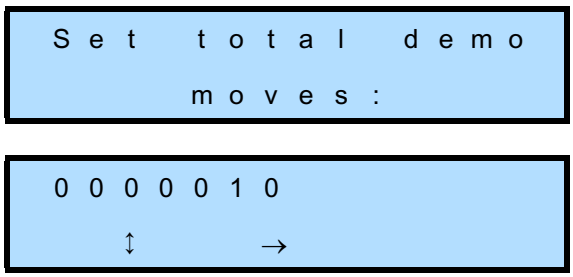


6. Use the up or down arrow keys to indicate whether you want the tape drive used in the demo. If you selected No, skip to step 7. If you selected Yes, press ENTER. The following screen appears.



Use the up or down arrow keys to indicate whether you want cartridges loaded in the tape drive or just inserted into the drive opening during the demo.

7. Press ENTER. The following screens appear.



8. Use the arrow keys to set the number of moves (the left and right arrow keys move across the columns; the up and down arrow keys change the numbers). Then press ENTER.

9. The autoloader begins the demo and displays status messages. If you want to stop a demo in progress, press ESCAPE.

ISSUING AUTOLOADER COMMANDS

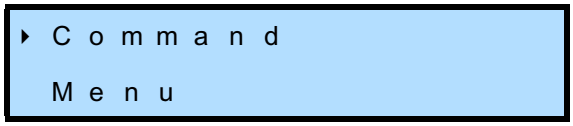
You can use the commands available through the Command Menu to perform isolated autoloader functions such as positioning the robot or moving a cartridge. Exercises available through the Command Menu can also be used to troubleshoot autoloader hardware problems. Refer to the diagram on page 58 for the element indexes. These numbers correspond to autoloader components and are necessary for some commands.

To use autoloader commands:

1. If necessary, disable security (see page 42).

2. Change the control mode to LCD (see page 46).

3. Press MENU to display the menus. Press the down arrow key until "Command Menu" appears.



4. Press ENTER. The LCD displays the first command.

5. Use the up or down arrow keys to select one of the commands (described in the following table), then press ENTER.

6. When the command is finished, the screen displays a status message. Press ESCAPE to return to the Command Menu or to stop a command in progress.

Table 4-4 describes the commands that are available from the Command menu.

Table 4-4 *Autoloader commands*

Command	Description
Move Cartridge	The robot moves a cartridge from one location to another. Specify the source and destination for the cartridge. If the destination is the tape drive, indicate whether you want the cartridge loaded into the drive. **Important:** If you insert a data cartridge into the tape drive, be aware that the drive will not automatically eject the data cartridge. However, if you insert a cleaning cartridge into the drive, the cartridge will be ejected when the cleaning is finished.
Initialize Element Status	The robot checks for cartridge presence and scans all of the cartridge labels.
Home Robot	The robot moves to the home position.
Park	The robot moves to the park position at the right side of the autoloader rotated toward the back (facing the tape drive).
Position to Element	The robot moves to a position in front of the tape drive, a fixed cartridge slot, or a magazine slot. Specify the destination element for the robot.
Self Test	The robot does the following: ▪ Moves from its current position to a position in front of the tape drive. ▪ Rotates 180 degrees on the wrist axis and moves to a position in front of slot 1. ▪ Rotates 180 degrees on the wrist axis and returns to a position in front the tape drive.
Cycle Pick/Put	The robot takes a cartridge from a specified element and replaces it in the same location. Specify the source element and the number of cycles for the exercise.
Cycle Reach	The robot moves in and out on the reach axis. Specify the number of cycles for the exercise.
Cycle X-Axis	The robot moves left and right on the horizontal (X) axis. Specify the number of cycles for the exercise.
Cycle Wrist	The robot's wrist rotates from the rear-facing position to the front-facing position. Specify the number of cycles for the exercise.
Cycle Solenoid	The solenoid that controls the locking mechanism on the door opens and closes. Specify the number of cycles for the exercise.

STORING CARTRIDGES

After you have filled cartridges with data, you may want to store them outside of the autoloader to make room for additional cartridges in the autoloader. To maximize the shelf life of your cartridges and ensure data integrity, follow these storage guidelines:

- **Store cartridges in a suitable environment**. Follow the specifications for storage temperature and other environmental requirements, as described on the cartridge packaging. Do not allow the temperature and humidity in the storage environment to fluctuate.
- **Store cartridges with the write-protect switch in the protected position.** See page 14 for information about setting the write-protect switch.
- **Keep the storage location as free of airborne particulates as possible**. To eliminate obvious sources of particulates, do not permit anyone to smoke, eat, or drink near the storage area, and do not store cartridges near a copier or printer that may emit toner and paper dust.
- **Store cartridges as soon as possible after you remove them from the autoloader.** Immediate storage helps avoid many of the conditions that can damage tapes, such as temperature and humidity fluctuation, particulate contamination, and excessive handling.
- **If possible, store cartridges in a cartridge magazine**. In the cartridge magazine, cartridges are protected from airborne contaminants by a clear plastic cover. With the cover in place, the magazines can be stacked on top of each other to make the most efficient use of storage space.

5

VIEWING AUTOLOADER INFORMATION

The autoloader maintains an internal database containing extensive information about its configuration and operations. This information is available through the operator panel. During day-to-day operation, you typically do not need to access this information. However, if you need to contact Exabyte Technical Support about your autoloader, you may be asked to check and report back on various settings and event results.

This chapter explains how to view the following:

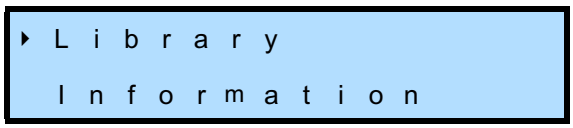
- Autoloader code version and serial number
- Statistics
- Sensor readings
- Autoloader INQUIRY data
- Cartridge inventory
- Tape drive information

Note: If your autoloader is equipped with the Ethernet option, you can also view autoloader information through the remote management utility. See Chapter 6 for more information.

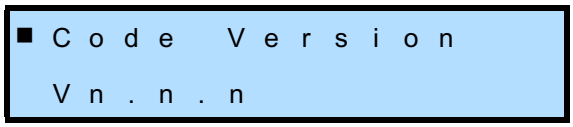
VIEWING THE AUTOLOADER'S CODE VERSION AND SERIAL NUMBER

To check the autoloader's code (firmware) version and serial number:

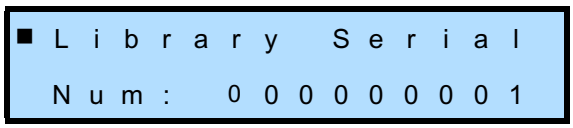
1. Press MENU to display the menus. Press the down arrow key until "Library Information" appears.



2. Press ENTER. The screen displays the code version, similar to the example below.



3. Press the down arrow key to display the serial number.

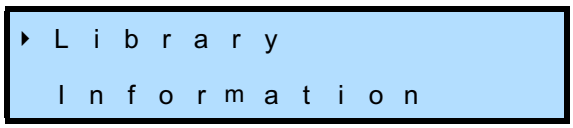


VIEWING AUTOLOADER STATISTICS

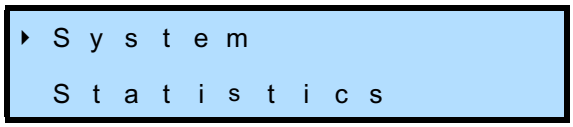
The System Statistics screens allow you to view historical data about robot moves to autoloader elements, pick and put retries, positioning retries, and powerup totals. The system statistics are cumulative totals from the time the autoloader was first installed; they do not restart from zero each time the autoloader is powered on.

To view autoloader statistics:

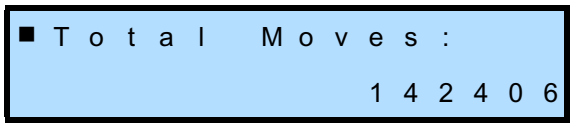
1. Press MENU to display the menus. Press the down arrow key until "Library Information" appears.



2. Press ENTER. Press the down arrow key until "System Statistics" appears.



3. Press ENTER. The first statistic to appear is Total Moves, as shown in the example below.



4. To display additional Statistics screens, press the down arrow.

Table 5-1 describes the information in the System Statistics screens.

Table 5-1 *Information available on the System Statistics screens*

System Statistic	Description[a]
Total Moves	The number of times the robot has picked a cartridge and placed it in a slot or tape drive.
Pick Retries	The number of times the robot retried picking a cartridge.
Put Retries	The number of times the robot retried placing a cartridge.
Rotate Retries	The number of times the robot retried rotating on the wrist axis.
PTE Retries	The number of times the robot performed a position to element (PTE) retry.
Powerup Count	The number of times the autoloader has been power cycled.

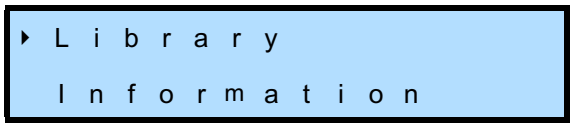
[a] Cumulative over the life of the autoloader.

VIEWING SYSTEM SENSORS

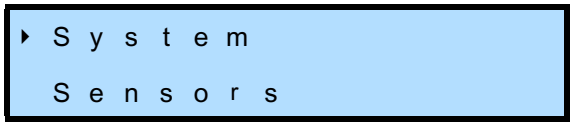
The System Sensors screens can assist in troubleshooting hardware problems by displaying the current status of the autoloader's internal mechanical sensors.

To view system sensor information:

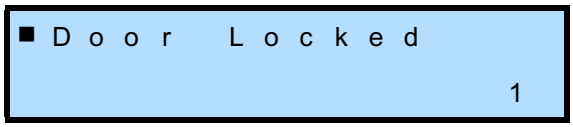
1. Press MENU to display the menus. Press the down arrow key until "Library Information" appears.



2. Press ENTER. Press the down arrow key until "System Sensors" appears.



3. Press ENTER. The first screen to appear is Door Locked, as shown in the example below.



4. To display additional screens, press the down arrow.

Table 5-2 describes the information in the System Sensors screens.

Table 5-2 *Information available on the System Sensors screens*

System Sensor	Description
Door Locked	The door is locked (1) or unlocked (0).
Door Closed 1	The first door sensor is on (1) or off (0).
Door Closed 2	The second door sensor is on (1) or off (0).
Cartridge Seated	A cartridge is seated in the robot (1) or the robot is empty (0).
Reach Position	The robot fingers are closed (1) or open (2).
Magazine Present	The magazine is installed (1) or removed (0).
X Axis Home	The robot is in the home position on the X axis (1) or not (0).
X Axis EOT	The robot is at the EOT (end of travel) position on the X axis (1) or not (0).
Wrist Back	The robot wrist position is toward the back of the autoloader (1) or not (0).
Wrist Front	The robot wrist position is toward the front of the autoloader (1) or not (0).
Bay 1 Occupied	A tape drive is installed in the drive bay (1) or the drive bay is empty (0).
Library Fan Fail	The autoloader's fan is operational (0) or has failed (1).
Drive 1 Fan Fail	The fan for the drive is operational (0) or has failed (1).

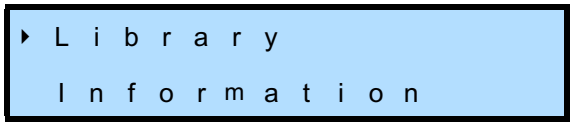
VIEWING AUTOLOADER INQUIRY DATA

From the Library Information screens, you can view the following INQUIRY data for the autoloader:

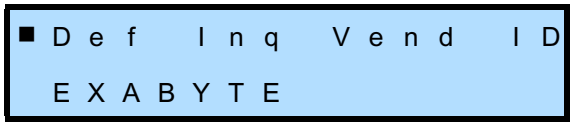
- **Def Inq Vend ID** - The default Vendor Identification value (EXABYTE), as reported in response to an INQUIRY command from an application.
- **Def Inq Prod ID** - The default Product Identification value (Exabyte 110L), as reported in response to an INQUIRY command from an application.

To view the autoloader's INQUIRY data:

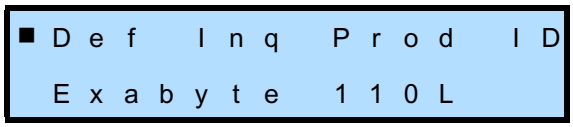
1. Press MENU to display the menus. Press the down arrow key until "Library Information" appears.



2. Press ENTER. Press the down arrow key until "Def Inq Vend ID" appears.



3. Press the down arrow key to display "Def Inq Prod ID."



VIEWING THE CARTRIDGE INVENTORY

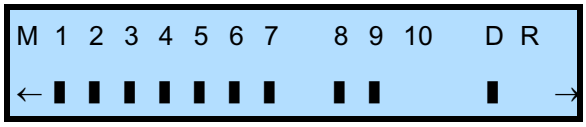
The Cartridge Inventory screens allow you to view information the autoloader maintains for each element. Elements are physical locations in the autoloader that can accept a cartridge (the magazine slots, the fixed slots, the tape drive, and the robot). Information maintained in the inventory includes whether an element contains a cartridge, bar code label information for the cartridge, the exact location of an element, and how many positioning retries have occurred at an element. The autoloader uses this information to process commands from the autoloader software. Viewing cartridge inventory information can aid in troubleshooting autoloader problems.

To view the cartridge inventory:

1. Press MENU to display the menus. The Cartridge Inventory screen appears.

2. Press ENTER to display the Cartridge Inventory screen.

   The Cartridge Inventory screen shows information about the slots in the magazine (M 1 through 7), the fixed cartridge slots (8 through 10), the drive (D), and the robot (R).



   The second line of the cartridge inventory screen can contain the following information:

   - A bar (▮) under the element number indicates that a cartridge is stored in that element.
   - A blank space indicates that no cartridge is stored in that element.
   - A dash (–) indicates that the slot is not usable because it is beyond the value set for the Maximum Addressable Element (see page 40).
   - A question mark (?) indicates that the Occupied flag for that element is not valid.

3. To view information about a specific element, use the left and right arrow keys to move across the columns. An underline indicates the currently selected element (for example, 1).

4. After you select an element, press ENTER to display the Index and Type information for the element. Use the up and down arrow keys to scroll through the fields.

Table 5-3 provides a description of each field in the cartridge inventory.

Table 5-3 *Cartridge inventory field descriptions*

Cartridge Inventory Field	Description
Index	Lists the index of the element for which the information is being displayed. (See page 58 for the element index number assignments.)
Type	Indicates the type of element: ▪ Cartridge slot ▪ Tape drive ▪ Robot
Warning	Displays 0 if there are no failures or errors associated with this element or displays an error code. See Chapter 8 for a list of error codes and corrective actions.
Occupied	Indicates whether the element contains a cartridge (1) or not (0).
Valid	Indicates whether the Occupied field is accurate (1) or is questionable (0).
Accessible	Indicates whether the tape drive is accessible (1) or not (0). The tape drive is accessible if it is installed in the drive bay and there is no cartridge loaded inside the drive. **Note:** This field applies only to tape drives. For all other elements, the value is 0.
Present	Indicates whether the tape drive or magazine is installed (1) or not (0). **Note:** If the element references a slot, this flag indicates whether the magazine is installed.
Label/Valid	If the element contains a cartridge whose bar code label has been scanned, the Label field contains the bar code label contents. The Valid field indicates whether the Label field is valid (1) or not (0).
Label Error	Indicates if the bar code scan was successful (0) or displays an error condition: 60 – The bar code scanner could not read the bar code label because there was no label on the cartridge. 62 – The bar code scanner could not read the label because the magazine is not present. 64 – The bar code scanner could not read the label because the label checksum is bad.
Sndvol Match (Send Volume Match)	Indicates whether the cartridge label matched the template sent with the last SCSI SEND VOLUME TAG command (1) or not (0).
Source	Displays the index of the last storage element from which the cartridge was moved. If the Source displays "255," the cartridge in that element has not been moved since the last reset.
Address	Displays the SCSI element address.
Reserved	Indicates whether the element is reserved by a host (1) or not (0).
Rsv Host ID	Displays the SCSI ID of the host that has reserved the element (if it is reserved).

Table 5-3 *Cartridge inventory field descriptions (continued)*

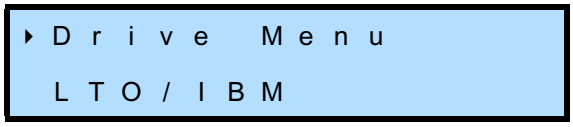
Cartridge Inventory Field	Description
Reserve ID	Displays the ID that the element is reserved under. This is a number assigned by a host when the reservation was made. If there is no reservation, the Reservation ID and Host ID columns display "0."
X Axis	Displays the distance the robot must move along the X axis to the specified element location.
W Axis	Indicates the direction the robot must face to access the element. A value of 0 indicates the robot must face the front of the autoloader; a value of 500 indicates the robot must face the back of the autoloader.
Total Puts/ Drive Loads	Shows the number of times the autoloader placed a cartridge in the element. (If the element is a slot, this field shows "Total Puts" since the last reset. If the element is the tape drive, it shows "Drive Loads" since the first power-on.)
Total Put Retries/ Drive Reloads	Shows the number of times the autoloader retried placing a cartridge in the element. (If the element is a slot, this field shows "Total Put Retries" since the last reset. If the element is the drive, it shows "Drive Reloads" since the first power-on.)
Total Pick Retries/ Drive Pick Retries	Shows the number of times the autoloader retried picking from the element. (If the element is a slot, this field shows "Total Pick Retries" since the last reset. If the element is the drive, it shows "Drive Pick Reloads" since the first power-on.)

VIEWING TAPE DRIVE INFORMATION

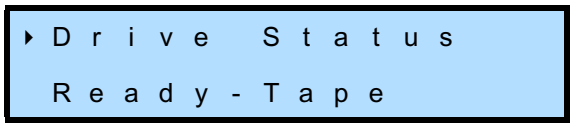
From the Drive Status screens, you can view status information about the tape drive, including the type of tape drive installed and its operational status. Tape drive information is updated whenever there is a change in drive status.

To view tape drive information:

1. Press MENU to display the menus. Press the down arrow key until "Drive Menu" appears.



2. Press ENTER. A screen similar to the example below appears.



3. Press ENTER.

4. Use the arrow keys to scroll through the status screens.

Table 5-4 describes the information in the Drive Status fields.

Table 5-4 *Status information available from the Drive Status screens*

Drive Status Field	Description
Type	Identifies the tape drive model.
Serial Number	Displays the tape drive's serial number.
Inq Version	Displays the four-character Inquiry version returned by the drive in response to a SCSI INQUIRY command.
Needs Cleaning	Indicates if the drive needs cleaning (1) or not (0).
Cart Status	Displays the status of the cartridge, if any, in the tape drive: ▪ Empty ▪ Ready No Tape ▪ Loading ▪ Ready Tape ▪ Reading ▪ Writing ▪ Tape in Motion ▪ Unloading ▪ Ready Tape Out ▪ Error ▪ Clean Drive ▪ No Comm ▪ Cleaning ▪ Unknown
Format	Displays the data format of the cartridge currently in the tape drive.
Warning	Indicates if the drive is free of errors (0) or displays an error code. For information about LTO Ultrium error codes, refer to the LTO Ultrium tape drive documentation available from IBM Corporation or visit www.storage.ibm.com.
Present	Indicates whether a drive is not installed (0) or is installed (1).
Access	Indicates if the drive is not present or there is a tape inside the drive (0), or the drive is present and there is no tape inside the drive (1).
Occupied	Indicates whether there is no cartridge loaded in the tape drive (0) or a cartridge is loaded in the tape drive (1).
Occup Valid (Occupied Valid)	Indicates whether the door has been opened or some other interruption has occurred so that the occupied information may not be reliable (0) or the occupied information is reliable (1).

NOTES

6

USING THE REMOTE MANAGEMENT UTILITY

If your autoloader is equipped with the Ethernet option, you can use the autoloader's remote management utility to set configuration options, view autoloader information, monitor, and manage operation across an Ethernet network. You can access the remote management utility using a standard web browser.

This chapter explains how to access the remote management utility and how to set configuration options, view information, and issue commands through the utility. If you plan to use the utility, refer to this chapter in conjunction with Chapter 3 – Configuring the Autoloader, Chapter 4 – Operating the Autoloader, and Chapter 5 – Viewing Autoloader Information.

WHERE TO FIND INSTRUCTIONS

The following is a list of tasks you can perform through the remote management utility. Instructions are provided on the referenced pages.

To Perform this Task...	See...
Access the remote management utility	page 75
Set the robot control mode	page 78
Configure the autoloader's interfaces –	
SCSI	page 78
Ethernet	page 79
Serial	page 83
Set configuration options –	
Emulation mode	page 84
Bar code scanning	page 84
Maximum number of addressable slots	page 85
Sequential mode operation	page 86
Door/LCD security	page 87
Remote manager security	page 89
Automatic tape drive cleaning	page 90
Unlock the front door	page 92
View information –	
SCSI	page 93
Network	page 95
Statistics	page 96
Sensor readings	page 100
Cartridge inventory	page 102
History	page 104
Tape drive	page 105
Run autoloader demos	page 107
Issue autoloader commands –	
Run the self test	page 108
Position the robot to an element	page 108
Park the robot	page 109
Home the robot	page 109
Scan bar code labels	page 110
Move a cartridge	page 110

To Perform this Task...	See...
Run diagnostic tests –	
Scan bar code labels	page 112
Pick and place a cartridge	page 112
Cycle an axis	page 113
Cycle a solenoid	page 114
Issue tape drive commands –	
Clean the tape drive	page 115
Unload the tape drive	page 116
Calibrate the autoloader and tape drive	page 117
Reset the autoloader and tape drive	page 118

ACCESSING THE REMOTE MANAGEMENT UTILITY

To access the autoloader's remote management utility:

1. Connect the autoloader to your Ethernet network as described on page 19.
2. If not already powered on, power on the autoloader as described on page 20.
3. Use the autoloader's operator panel to set up the Ethernet interface as described on page 31. Make a note of the autoloader's IP address.
4. Launch your web browser and enter the autoloader's IP address in the following format:

   ```
   http://IP address
   ```

5. Press Enter. The utility's Home page appears. Figure 6-1 shows an example of the Home page.

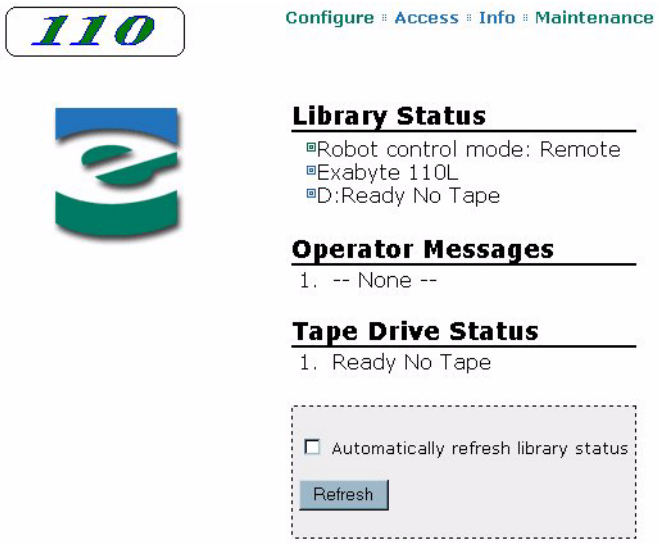


Figure 6-1 *Remote management utility – Home page*

The Home page provides information in three sections:

- **Library Status** – Indicates the current robot control mode and any messages displayed on the first and second lines of the autoloader's LCD.
- **Operator Messages** – Provides information when the autoloader is operating in sequential mode.
- **Tape Drive Status** – Indicates the current status of the tape drive.

At the bottom of the Home page is a Refresh button that you can click to update the information on the page. An option for automatically refreshing the page is also available. To use this option, check the Automatically refresh library status box and click on the Refresh button. The information on the page is refreshed approximately every 3 seconds.

ACCESSING ADDITIONAL PAGES

At the top of each page, you can click on links to access the following pages:

- **Configure** – Provides selections for changing the autoloader's robot control mode; configuring the SCSI, network (Ethernet), and serial interfaces; and configuring system-wide, security, and tape drive cleaning settings.
- **Access** – Provides a selection for unlocking the autoloader's door.
- **Info** – Provides selections for viewing SCSI and network interface information; viewing autoloader statistics, sensor values, cartridge inventory, and history; and viewing tape drive information.

- **Maintenance** – Provides selections for running the autoloader in demo mode, issuing individual autoloader and tape drive commands, performing autoloader diagnostic tests, calibrating autoloader elements, and resetting the autoloader and tape drive.

Clicking on the product name at the top left from any page returns you to the Home page. Clicking on the Exabyte "e" logo takes you to Exabyte's web site at www.exabyte.com.

SETTING CONFIGURATION OPTIONS

Click on Configure at the top of the page to view the Configure page. Figure 6-2 shows an example of the Configure page.

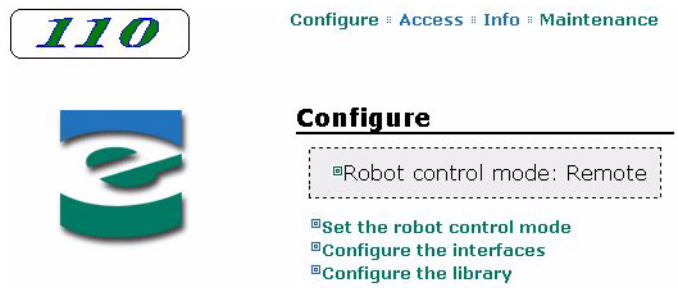


Figure 6-2 *Remote management utility – Configure page*

The Configure page indicates the autoloader's current robot control mode. From this page, you can make the following selections:

- **Set the robot control mode** – Choose the source of commands issued to the robot to move cartridges.
- **Configure the interfaces** – Specify settings for the autoloader's SCSI interface, network (Ethernet) interface, and serial interface.
- **Configure the library** – Specify an emulation mode, bar code scanning options, maximum addressable slot, sequential mode options, security, and tape drive cleaning settings.

SETTING THE ROBOT CONTROL MODE

The robot control mode determines which interface controls the robot. Refer to page 46 for descriptions of the available robot control modes.

To set the robot control mode:

1. Click on Configure at the top of the page.
2. Click on Set the robot control mode. A page similar to Figure 6-3 appears.

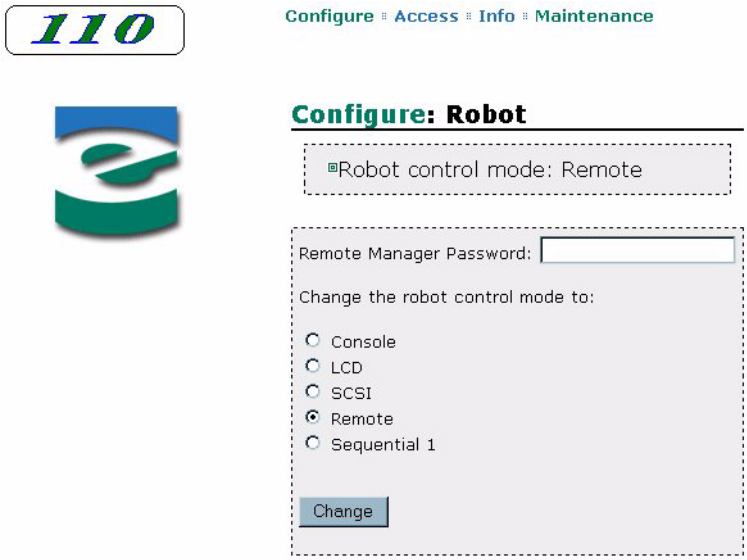


Figure 6-3 *Remote management utility – Robot Control Mode Configuration page*

3. If necessary, enter the remote manager password (see page 89).
4. Click on the radio button for the new control mode.
5. Click on the Change button. The new control mode takes effect.

CONFIGURING THE INTERFACES

From the remote management utility, you can configure the autoloader's SCSI, network, and serial interfaces.

Configuring the SCSI Interface

You can set the SCSI IDs for the autoloader and tape drive and enable or disable SCSI parity checking. See page 29 for information about SCSI IDs. See page 30 for information about SCSI parity checking.

To configure the autoloader's SCSI interface:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.

3. Click on Configure the SCSI interface. A page similar to Figure 6-4 appears.

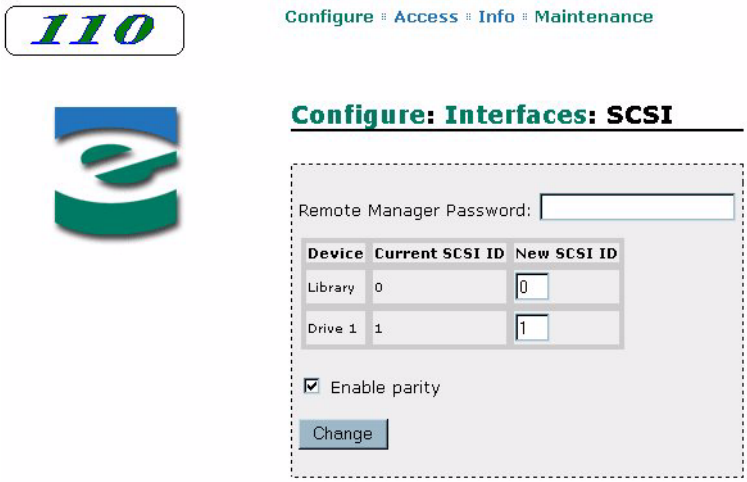


Figure 6-4 *Remote management utility – SCSI Interface Configuration page*

4. If necessary, enter the remote manager password (see page 89).
5. Enter new SCSI IDs for the autoloader ("Library") and tape drive, as desired.
6. Check or uncheck the Enable parity box.
7. Click on the Change button. The changes take effect.

Configuring the Network (Ethernet) Interface

For the autoloader's network interface, you can set up the network addresses, specify the SNMP trap recipient address, and change the FTP user name and password. See page 31 for information about network addresses, SNMP, and FTP settings.

Setting Up the Network Addresses To set up the autoloader's network addresses:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the network interface.

4. Click on Set up the network interface. A page similar to Figure 6-5 appears.

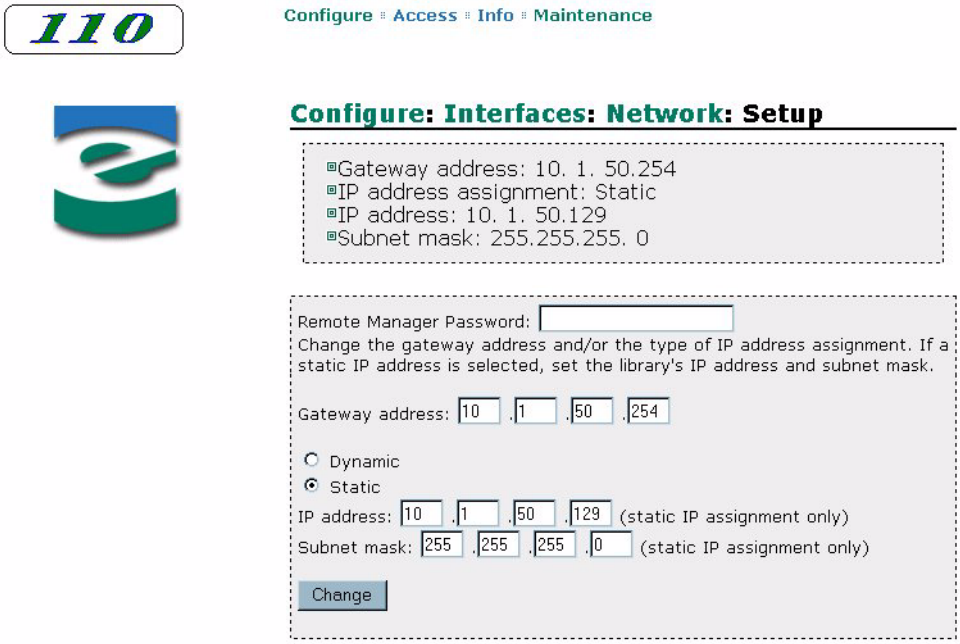

Configure Access Info Maintenance
Configure: Interfaces: Network: Setup
Gateway address: 10. 1. 50.254
IP address assignment: Static
IP address: 10. 1. 50.129
Subnet mask: 255.255.255. 0
Remote Manager Password:
Change the gateway address and/or the type of IP address assignment. If a static IP address is selected, set the library's IP address and subnet mask.
Gateway address: 10 .1 .50 .254
Dynamic
Static
IP address: 10 .1 .50 .129 (static IP assignment only)
Subnet mask: 255 .255 .255 .0 (static IP assignment only)
Change

Figure 6-5 *Remote management utility – Network Interface Configuration page*

5. If necessary, enter the remote manager password (see page 89).
6. Enter a new value for the Gateway address, as desired.
7. Click on the radio button for Dynamic or Static addressing.
8. If you selected Static addressing, enter values for the IP address and Subnet mask, as desired.
9. Click on the Change button. The changes take effect.

Setting the SNMP Trap Recipient Address To set the SNMP trap recipient address:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the network interface.
4. Click on Configure SNMP. A page similar to Figure 6-6 appears.

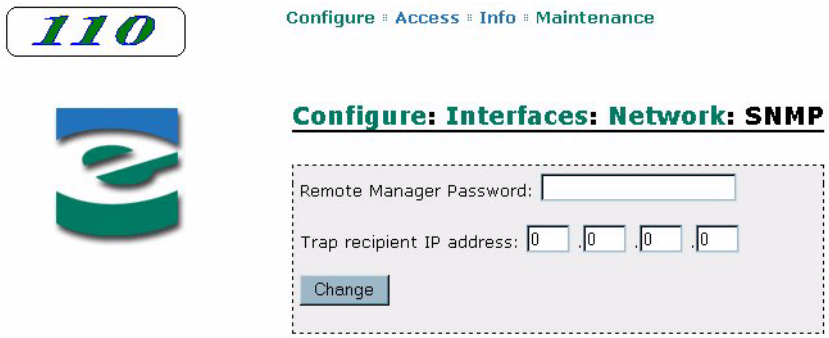

110
Configure | Access | Info | Maintenance
Configure: Interfaces: Network: SNMP
Remote Manager Password:
Trap recipient IP address: 0 .0 .0 .0
Change

Figure 6-6 *Remote management utility – SNMP Configuration page*

5. If necessary, enter the remote manager password (see page 89).
6. Enter a new value for the trap recipient IP address, as desired.
7. Click on the Change button. The change takes effect.

Changing the FTP User Name and Password To change the FTP user name:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the network interface.
4. Click on Configure FTP.
5. Click on Change the FTP user name. A page similar to Figure 6-7 appears.

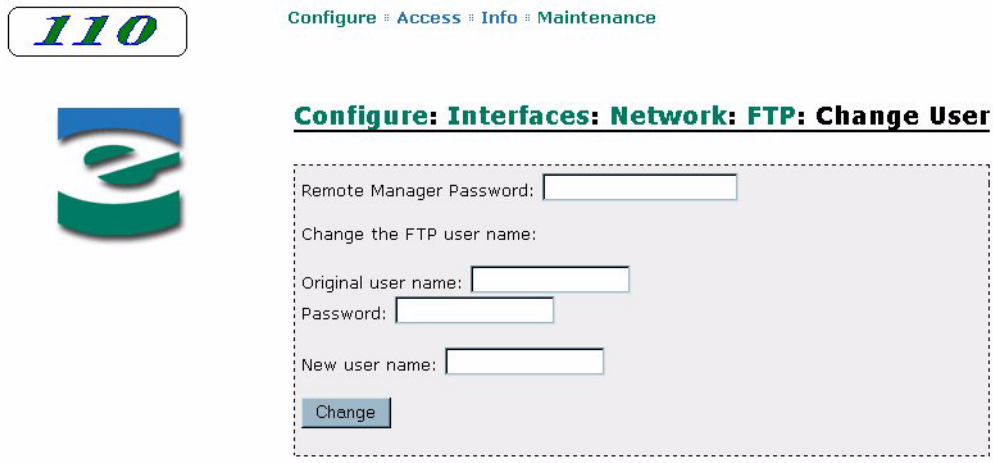


Figure 6-7 *Remote management utility – Change FTP User Name page*

6. If necessary, enter the remote manager password (see page 89).

7. Enter the current user name and password.

   Note: The factory default user name is *anonymous* and the password is *Exabyte*. The user name and password are case-sensitive.

8. Enter a new user name, up to 16 characters.

9. Click on the Change button. The change takes effect.

To change the FTP password:

1. Click on Configure at the top of the page.

2. Click on Configure the interfaces.

3. Click on Configure the network interface.

4. Click on Configure FTP.

5. Click on Change the FTP password. A page similar to Figure 6-8 appears.

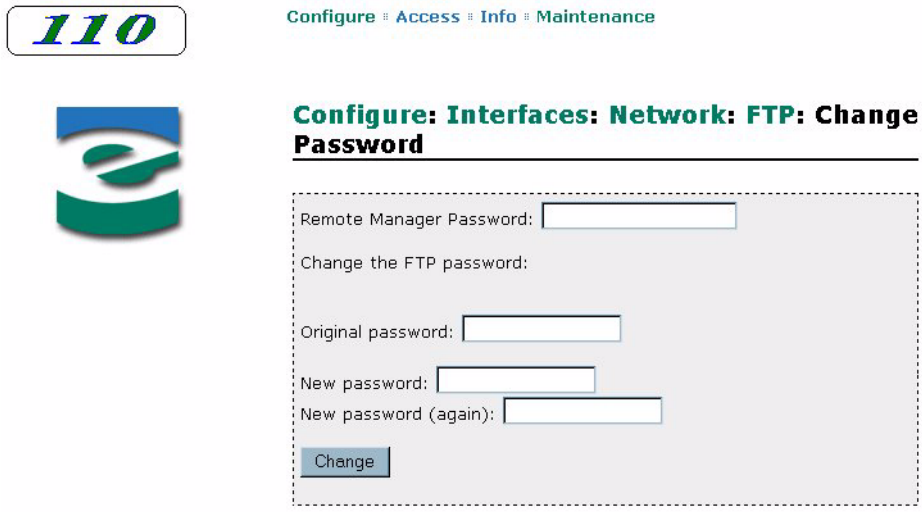


Figure 6-8 *Remote management utility – Change FTP Password page*

6. If necessary, enter the remote manager password (see page 89).

7. Enter the current password.

   Note: The factory default password is *Exabyte*. The password is case-sensitive.

8. Enter a new password, up to 16 characters. Re-type the password to confirm it.

9. Click on the Change button. The change takes effect.

Configuring the Serial Interface

For the autoloader's serial interface, you can specify the baud rate. You can use the serial interface for upgrading firmware and creating diagnostic listings. See page 124 for information about using the autoloader's serial interface.

To set the baud rate for the autoloader's serial interface:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the serial interface. A page similar to Figure 6-9 appears.

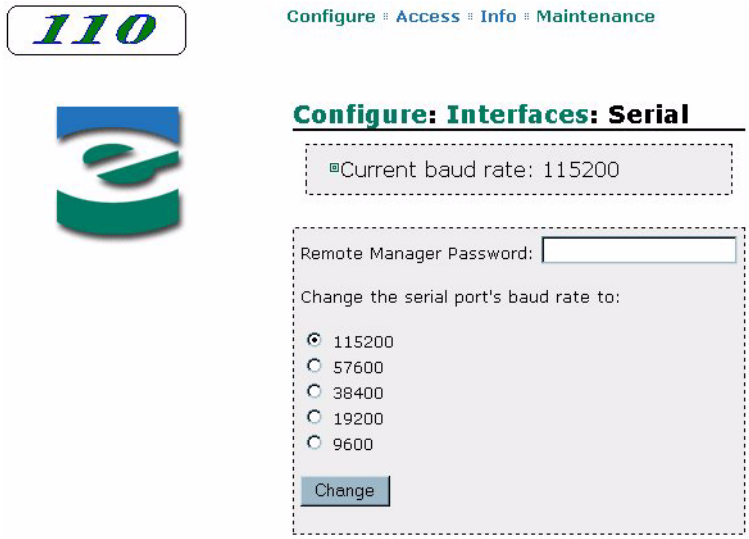


Figure 6-9 *Remote management utility – Serial Interface Configuration page*

4. If necessary, enter the remote manager password (see page 89).
5. Click the radio button for the new baud rate.
6. Click on the Change button. The change takes effect.

CONFIGURING THE AUTOLOADER

From the remote management utility, you can specify settings for the following system options:

- Emulation mode
- Bar code scanning
- Maximum number of addressable slots
- Sequential mode
- Autoloader security
- Remote manager security
- Automatic tape drive cleaning

Changing the Emulation Mode

If your application software is not yet certified for the 110L, you can change the autoloader's emulation mode. See page 35 for information about emulation modes.

To change the emulation mode:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library system. A page similar to Figure 6-10 appears.

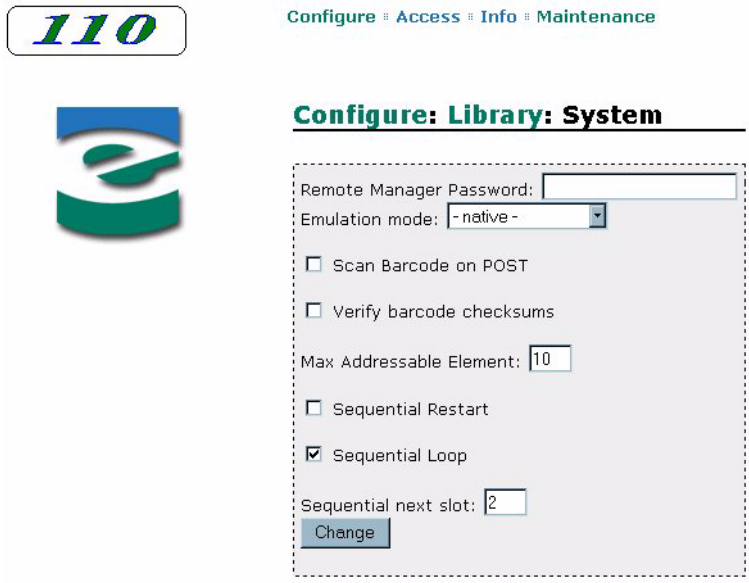


Figure 6-10 *Remote management utility – Library System Configuration page*

4. If necessary, enter the remote manager password (see page 89).
5. Select the new emulation mode from the pulldown menu.
6. Click on the Change button. The change takes effect.

Note: After changing the autoloader's emulation mode, you will need to reboot your host computer so that it recognizes the new emulation mode.

Setting Bar Code Scanning Options

If your autoloader is equipped with a bar code scanner, you can set options that determine when the autoloader scans all of the cartridge labels and whether the autoloader verifies checksum characters on the labels.

If you want the autoloader to scan all bar code labels whenever it is powered up or the door is opened and closed, you can enable the POST bar code scan option. By default this option is disabled. See page 38 for more information about this option.

If your bar code labels contain checksum characters, you should enable the Verify Barcode Checksums option. By default, this option is disabled. See page 39 for more information about this option.

To enable or disable the bar code scanning options:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library system. A page similar to Figure 6-11 appears.

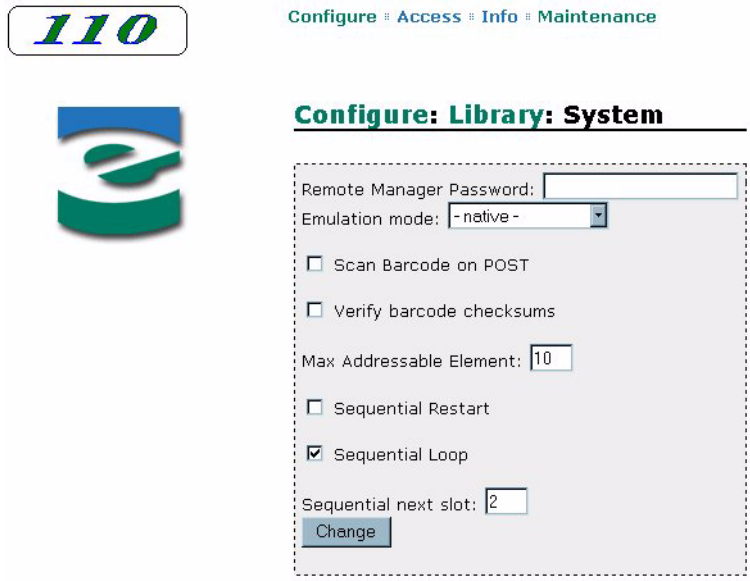


Figure 6-11 *Remote management utility – Library System Configuration page*

4. If necessary, enter the remote manager password (see page 89).
5. Check or uncheck the Scan Barcode on POST box.
6. Check or uncheck the Verify barcode checksums box.
7. Click on the Change button. The changes take effect.

Setting the Maximum Number of Addressable Slots

Setting the maximum number of addressable slots causes the autoloader to use and report fewer slots than are physically present. Use this option if your application bases licensing on the number of slots being used and you are using fewer than the full number of slots in the autoloader. See page 40 for more information about this option.

To set the maximum number of available slots:

1. Click on Configure at the top of the page.
2. Click on Configure the library.

3. Click on Configure library system. A page similar to Figure 6-12 appears.

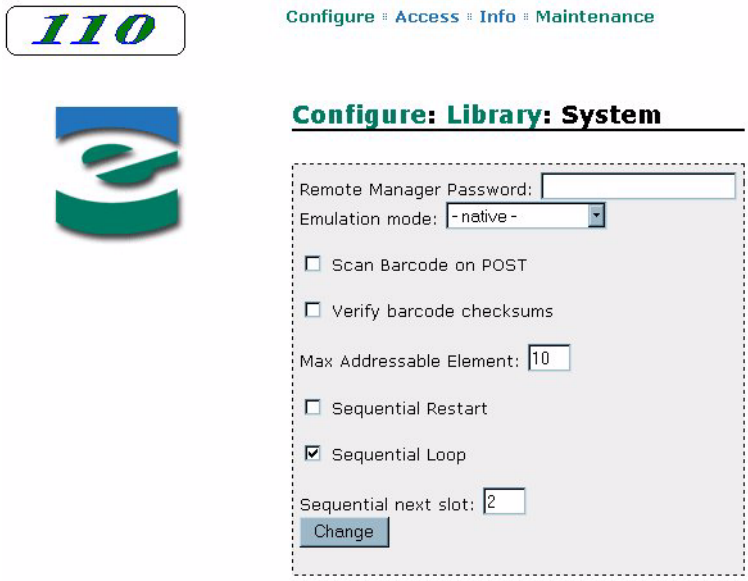


Figure 6-12 *Remote management utility – Library System Configuration page*

4. If necessary, enter the remote manager password (see page 89).

5. In the Max Addressable Element field, enter the element index of the highest numbered slot you want the autoloader to use. See page 58 for element index number assignments.

6. Click on the Change button. The change takes effect.

Setting Sequential Mode Options

When the autoloader is operating in sequential mode, it automatically moves cartridges sequentially between the cartridge slots and the tape drive, without instructions from an application. To customize how sequential mode works, you can set the Loop, Restart, and Next Cartridge options. See page 49 for more information about sequential operation and the sequential mode options.

To set sequential mode options:

1. Click on Configure at the top of the page.

2. Click on Configure the library.

3. Click on Configure library system. A page similar to Figure 6-12 appears.

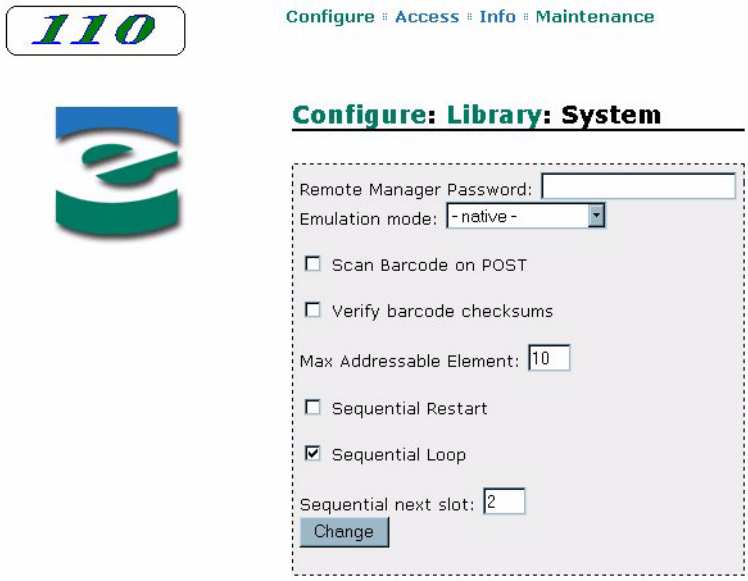


Figure 6-13 *Remote management utility – Library System Configuration page*

4. If necessary, enter the remote manager password (see page 89).
5. Check or uncheck the Sequential Restart and Sequential Loop boxes, as desired.
6. Specify a slot number in the Sequential next slot field, as desired.
7. Click on the Change button. The changes take effect.

Setting Up Autoloader (Door/LCD) Security

If you want to restrict access to the autoloader, you can set a password that users must enter at the operator panel before the door can be opened or configuration options can be changed from the operator panel. See page 41 for more information about LCD security.

Enabling the Door/LCD Password To enable a door/LCD password:

1. Click on Configure at the top of the page.
2. Click on Configure the library.

3. Click on Configure library Door/LCD security. A page similar to Figure 6-14 appears.

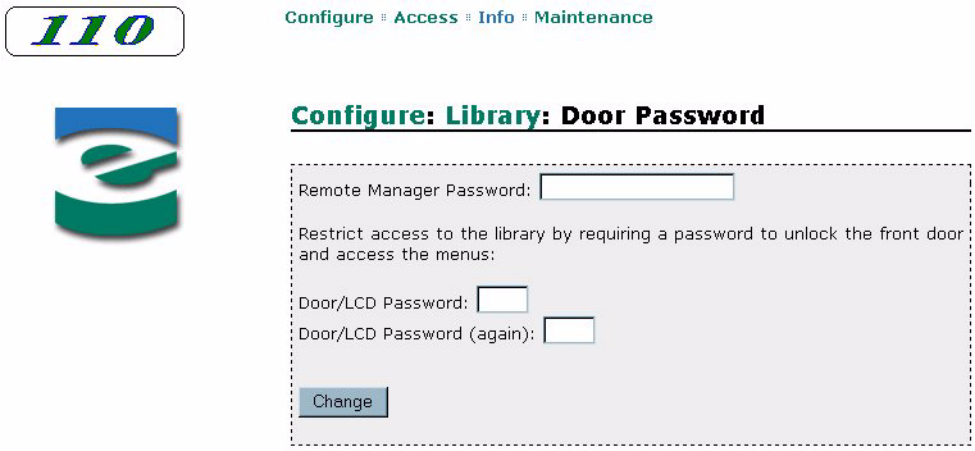

Configure | Access | Info | Maintenance
Configure: Library: Door Password
Remote Manager Password:
Restrict access to the library by requiring a password to unlock the front door and access the menus:
Door/LCD Password:
Door/LCD Password (again):
Change

Figure 6-14 *Remote management utility – Door/LCD Password Configuration (Enable) page*

4. If necessary, enter the remote manager password (see page 89).
5. Enter a numeric password for unlocking the door and using the LCD, up to 3 digits. Re-type the password to confirm it.
6. Click on the Change button. The password takes effect.

Disabling the Door/LCD Password To disable the door/LCD password:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library Door/LCD security. A page similar to Figure 6-15 appears.

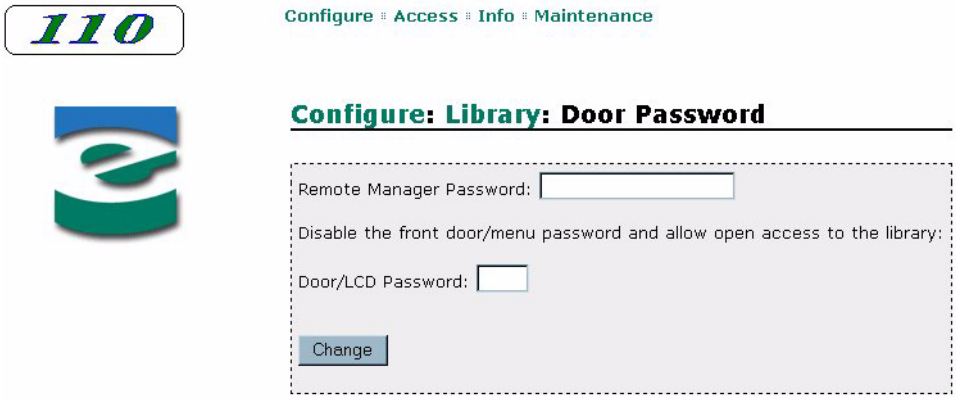

Configure | Access | Info | Maintenance
Configure: Library: Door Password
Remote Manager Password:
Disable the front door/menu password and allow open access to the library:
Door/LCD Password:
Change

Figure 6-15 *Remote management utility – Door/LCD Password Configuration (Disable) page*

4. If necessary, enter the remote manager password (see page 89).

5. Enter the door/LCD password.

6. Click on the Change button. The password is disabled.

Setting Up Remote Manager Security

If you want to restrict access to the remote manager utility, you can set up a password that users must enter in the utility before changing configuration options.

Note: If you set a remote manager password, the password applies only to activities that could disrupt autoloader operation. Informational pages are still available without the password.

Enabling the Remote Manager Password To enable a remote manager password:

1. Click on Configure at the top of the page.

2. Click on Configure the library.

3. Click on Configure library Remote Manager security. A page similar to Figure 6-16 appears.

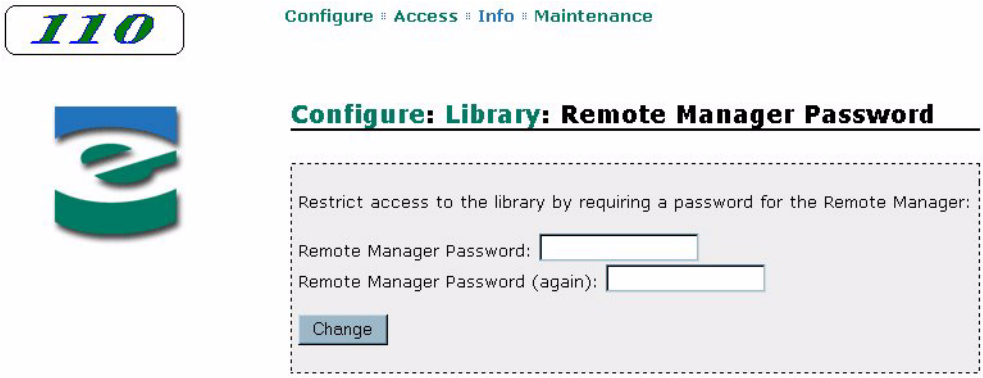

110
Configure | Access | Info | Maintenance
Configure: Library: Remote Manager Password
Restrict access to the library by requiring a password for the Remote Manager:
Remote Manager Password:
Remote Manager Password (again):
Change

Figure 6-16 *Remote management utility – Remote Manager Security Configuration (Enable) page*

4. Enter a password for using the remote management utility, up to 18 characters. Re-type the password to confirm it.

   Note: The password is case-sensitive.

5. Click on the Change button. The password takes effect.

Disabling the Remote Manager Password To disable the remote manager password:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library Remote Manager security. A page similar to Figure 6-17 appears.

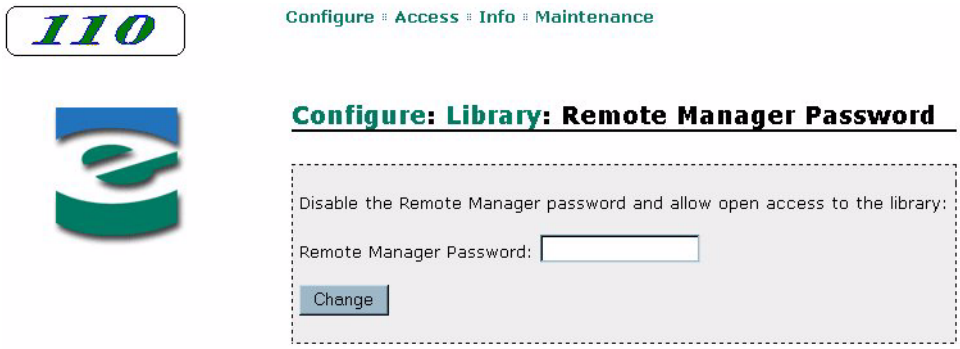

Configure Access Info Maintenance
Configure: Library: Remote Manager Password
Disable the Remote Manager password and allow open access to the library:
Remote Manager Password:
Change

Figure 6-17 *Remote management utility – Remote Manager Password Configuration (Disable) page*

4. Enter the remote manager password.

   Note: The password is case-sensitive.

5. Click on the Change button. The password is disabled.

Setting Up Automatic Tape Drive Cleaning

If you want the autoloader to automatically perform tape drive cleanings, you can enable the Autoclean option, activate the cleaning cartridge slot, and specify the number of cleaning cycles available on the cleaning cartridge. See page 36 for more information about these settings.

! **Important** If you plan to use automatic cleaning, make sure that you have installed a cleaning cartridge in the cleaning cartridge slot location (see page 15).

If your autoloader software has a cleaning option, be sure to turn that option OFF.

To set up automatic tape drive cleaning:

1. Click on Configure at the top of the page.
2. Click on Configure the library.

3. Click on Configure drive cleaning settings. A page similar to Figure 6-18 appears. This page indicates the current slot designated for a cleaning cartridge, the number of cleaning cycles remaining for the cleaning cartridge (if present), and whether the Autoclean option is enabled or disabled.

Figure 6-18 *Remote management utility – Drive Cleaning Configuration page*

4. If necessary, enter the remote manager password (see page 89).
5. If you want to enable the Autoclean option, click the Yes radio button to activate the cleaning cartridge slot.
6. Specify the number of cleaning cycles available on the cleaning cartridge.
7. Check the Enable autoclean box.
8. Click on the Change button. The changes take effect.

UNLOCKING THE FRONT DOOR

If necessary, you can access cartridges and the tape drive by opening the front door. To open the front door, you must unlock it.

Note: Opening and closing the door causes the autoloader to perform a cartridge inventory.

This section explains how to unlock the front door from the remote management utility. See page 13 for information about how to remove and replace cartridges.

! **Important** The front door may be prevented from unlocking by the autoloader application. If access has been prevented through the application, you must issue commands from the application to allow access.

To unlock the door:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Access at the top of the page.
3. Click on Unlock the library's front door. A page similar to Figure 6-19 appears.

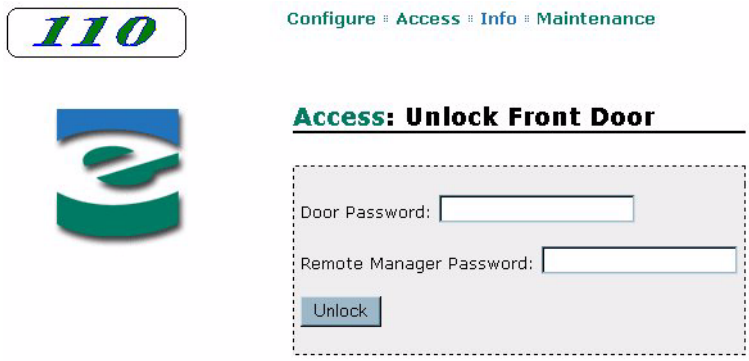


Figure 6-19 *Remote management utility – Unlock Front Door page*

4. If necessary, enter the door password (see page 87).
5. If necessary, enter the remote manager password (see page 89).
6. Click on the Unlock button. The front door unlocks.

After you have finished removing and replacing cartridges, close the front door. The door locks automatically.

VIEWING INTERFACE, AUTOLOADER, AND TAPE DRIVE INFORMATION

The autoloader maintains an internal database containing information about its configuration and operations. You can view this information through the remote management utility.

Click on Info at the top of the page to view the Info page. Figure 6-20 shows an example of the Info page.

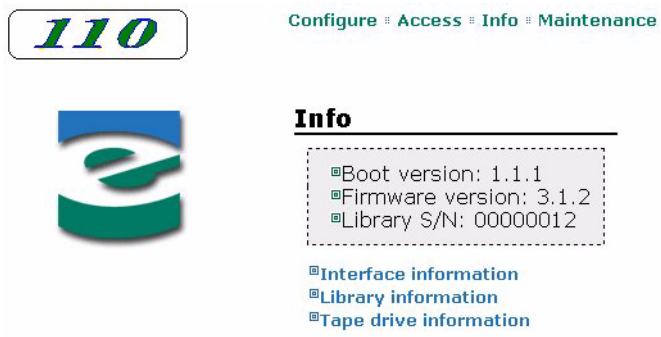


Figure 6-20 *Remote management utility – Info page*

The Info page indicates the autoloader's boot code version, firmware version, and serial number. From this page, you can make the following selections:

- **Interface information** – View SCSI and network interface information.
- **Library information** – View statistics, sensor values, cartridge inventory data, and history.
- **Tape drive information** – View tape drive identification and status information.

VIEWING INTERFACE INFORMATION

You can view information for the following interfaces:

- SCSI
- Network

Viewing SCSI Information

To view SCSI information:

1. Click on Info at the top of the page.
2. Click on Interface information.

3. Click on SCSI information. A page similar to Figure 6-21 appears.

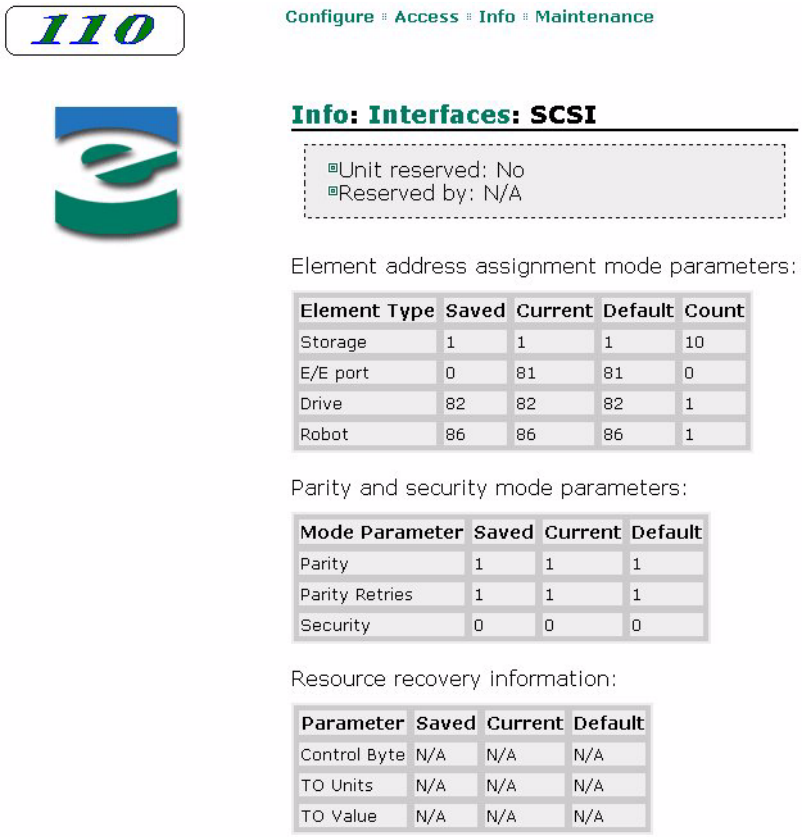

110
Configure | Access | Info | Maintenance
Info: Interfaces: SCSI
Unit reserved: No
Reserved by: N/A
Element address assignment mode parameters:
Element Type | Saved | Current | Default | Count
Storage | 1 | 1 | 1 | 10
E/E port | 0 | 81 | 81 | 0
Drive | 82 | 82 | 82 | 1
Robot | 86 | 86 | 86 | 1
Parity and security mode parameters:
Mode Parameter | Saved | Current | Default
Parity | 1 | 1 | 1
Parity Retries | 1 | 1 | 1
Security | 0 | 0 | 0
Resource recovery information:
Parameter | Saved | Current | Default
Control Byte | N/A | N/A | N/A
TO Units | N/A | N/A | N/A
TO Value | N/A | N/A | N/A

Figure 6-21 *Remote management utility – SCSI Interface Information page*

This page indicates whether the autoloader is reserved by a host, and, if the autoloader is reserved, indicates the host's SCSI ID. This page also displays element address, parity, and security information for the autoloader. These parameters are equivalent to those reported by the autoloader in response to a MODE SENSE command issued by the application software. For information about the MODE SENSE command, refer to the *Exabyte 110L, 215, 221L, and 430 SCSI Reference*.

For each parameter, the following values are provided:

- **Saved** – The value specified as the power- on default by a MODE SELECT command. After a saved value has been specified with a MODE SELECT command, this value takes effect immediately and each time you power on the autoloader.
- **Current** – The value currently active. It is either the power-on default or a temporary value set by the latest MODE SELECT command.
- **Default** – The original value set at the factory.

Table 6-1 describes the information on this page.

Table 6-1 *SCSI interface mode parameters*

Field	Description
Storage	The element address of the first cartridge storage location. (See page 58 for information about element addresses.) The Count value indicates the number of storage elements in the autoloader.
E/E Port	The element address of the first entry/exit port slot. The Count value indicates the number of slots in the entry/exit port. **Note:** The 110L does not include an entry/exit port, so the Count value is 0.
Drive	The element address of the tape drive. The Count value indicates the number of tape drives in the autoloader.
Robot	The element address of the robot. The Count value indicates the number of robots.
Parity	The setting for SCSI parity checking (1=on, 0=off). When the parity option is on, the autoloader checks all data coming across the SCSI bus for parity.
Parity Retries	The number of times the autoloader will retry a SCSI phase after detecting a parity error.
Security	Whether the autoloader's menus are password protected (1=protected, 0=not protected).
Control Byte	A Fibre Channel protocol parameter (applicable to Fibre Channel libraries only).
TO Units	A Fibre Channel protocol parameter (applicable to Fibre Channel libraries only).
TO Value	A Fibre Channel protocol parameter (applicable to Fibre Channel libraries only).

Viewing Network Information

To view network information:

1. Click on Info at the top of the page.
2. Click on Interface information.
3. Click on Network information. A page similar to Figure 6-22 appears.

Figure 6-22 *Remote management utility – Network Interface Information page*

This page provides the following information:

- **MAC address** – The serial number of the autoloader's Ethernet adapter card.
- **IP address** – The autoloader's network address.

VIEWING AUTOLOADER INFORMATION

You can view the following information for the autoloader:

- **Statistics** – View autoloader system statistics, bar code label scanning statistics, cartridge storage element statistics, and tape drive statistics.
- **Sensors** – View current readings from the autoloader's internal mechanical sensors.
- **Inventory** – View information for each cartridge location in the autoloader, including occupied status, bar code label information, and reservation status.
- **History** – View the autoloader's event log.

Viewing Autoloader Statistics

You can view the following types of autoloader statistics:

- Library system statistics
- Bar code label statistics
- Storage element statistics
- Tape drive statistics

Viewing Library System Statistics To view autoloader system statistics:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Statistics.

4. Click on Library Statistics. A page similar to Figure 6-23 appears.

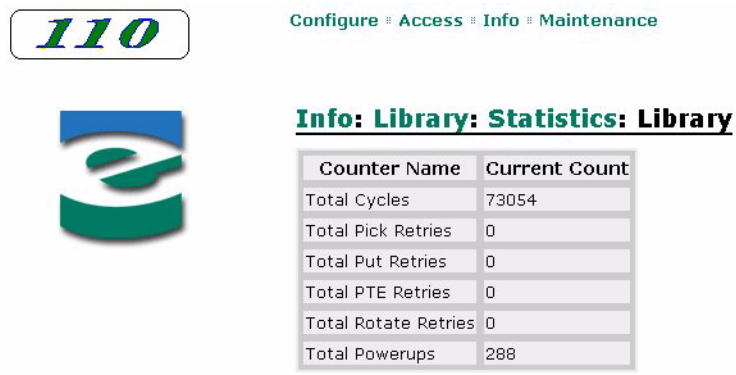


Figure 6-23 *Remote management utility – Library Statistics page*

Table 6-2 describes the information on this page.

Table 6-2 *Library system statistics*

Statistic	Description[a]
Total Cycles	The number of times the robot has picked a cartridge and placed it in a slot or the tape drive.
Total Pick Retries	The number of times the robot retried picking a cartridge.
Total Put Retries	The number of times the robot retried placing a cartridge.
Total PTE Retries	The number of times the robot performed a position to element (PTE) retry.
Total Rotate Retries	The number of times the robot retried rotating on the wrist axis.
Total Powerups	The number of times the autoloader has been power cycled.

[a] Cumulative over the life of the autoloader.

Viewing Bar Code Label Statistics To view bar code label statistics:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Statistics.

4. Click on Bar Code Label Statistics. A page similar to Figure 6-24 appears.

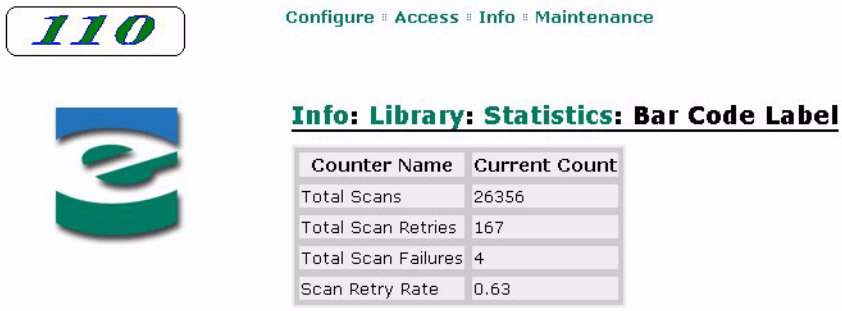


Figure 6-24 *Remote management utility – Bar Code Label Statistics page*

Table 6-3 describes the information on this page.

Table 6-3 *Bar code label statistics*

Statistic	Description
Total Scans	The number of times the robot scanned a bar code label.
Total Scan Retries	The number of times the robot retried scanning a bar code label.
Total Scan Failures	The number of times the robot failed scanning a bar code label. (The robot tries to scan a bar code several times before it logs a failure.)
Scan Retry Rate	The percentage of scans that required retries.

Viewing Storage Element Statistics Storage elements are physical locations in the autoloader that can accept a cartridge (the magazine slots, the fixed slots, the tape drive, and the robot). To view storage element statistics:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Statistics.
4. Click on Storage Element Statistics. A page similar to Figure 6-25 appears.

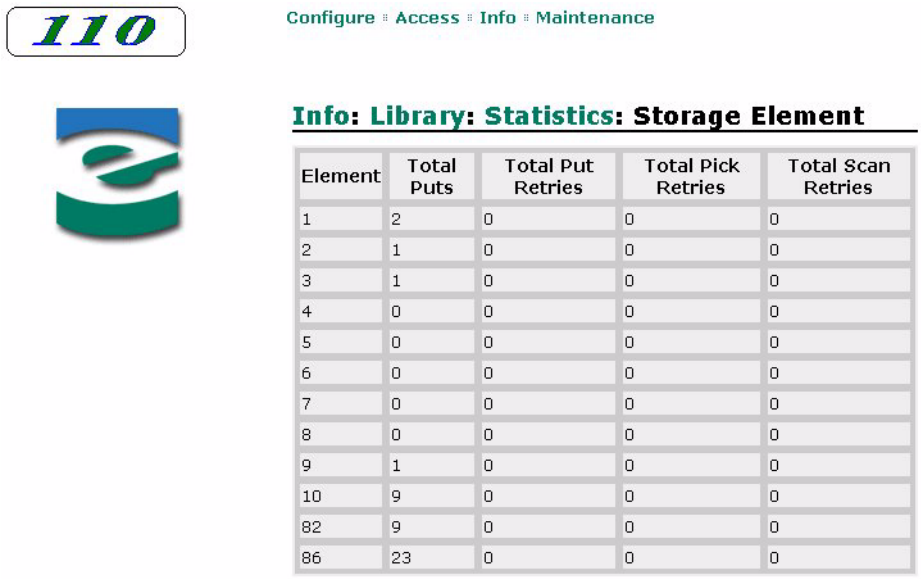

110
Configure | Access | Info | Maintenance
Info: Library: Statistics: Storage Element
Element
Total Puts
Total Put Retries
Total Pick Retries
Total Scan Retries
1 2 0 0 0
2 1 0 0 0
3 1 0 0 0
4 0 0 0 0
5 0 0 0 0
6 0 0 0 0
7 0 0 0 0
8 0 0 0 0
9 1 0 0 0
10 9 0 0 0
82 9 0 0 0
86 23 0 0 0

Figure 6-25 *Remote management utility – Storage Element Statistics page*

Table 6-4 describes the information on this page.

Table 6-4 *Storage element statistics*

Field	Description
Element	The index number of the element for which the information is being displayed. (See page 58 for element index number assignments.)
Total Puts	The number of times the autoloader placed a cartridge in the element.
Total Put Retries	The number of times the autoloader retried placing a cartridge in the element.
Total Pick Retries	The number of times the autoloader retried picking from the element.
Total Scan Retries	The number of times the robot retried scanning a bar code label on a cartridge at the element.

Viewing Tape Drive Statistics To view tape drive statistics:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Statistics.

4. Click on Tape Drive Statistics. A page similar to Figure 6-26 appears.

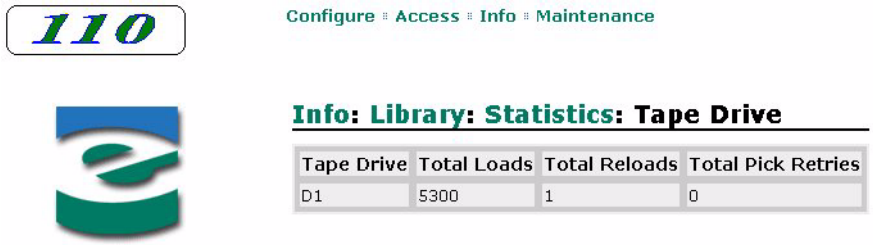


Figure 6-26 *Remote management utility – Tape Drive Statistics page*

Table 6-5 describes the information on this page.

Table 6-5 *Tape drive statistics*

Field	Description
Tape Drive	D1 is the tape drive.
Total Loads	The number of times the autoloader placed a cartridge in the tape drive since the first power-on.
Total Reloads	The number of times the autoloader retried placing a cartridge in the tape drive since the first power-on.
Total Pick Retries	The number of times the autoloader retried picking from the tape drive since the first power-on.

Viewing Sensor Readings

To view autoloader sensor readings:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Sensors. A page similar to Figure 6-27 appears.

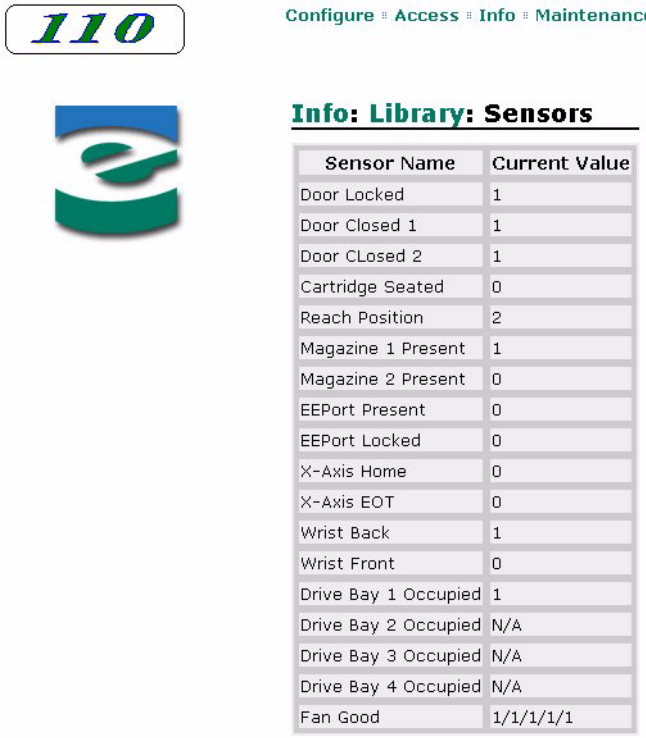


Figure 6-27 *Remote management utility – Library Sensors page*

Table 6-6 describes the information on this page.

Table 6-6 *Sensors*

Sensor	Description
Door Locked	The door is locked (1) or unlocked (0).
Door Closed 1	The first door sensor is on (1) or off (0).
Door Closed 2	The second door sensor is on (1) or off (0).
Cartridge Seated	A cartridge is seated in the robot (1) or the robot is empty (0).
Reach Position	The robot fingers are closed (1) or open (2).
Magazine 1 Present	The magazine is installed (1) or removed (0).
Magazine 2 Present	The magazine is installed (1) or removed (0). **Note:** The 110L contains only one magazine, so this value is 0.
EEPort Present	The entry/exit port caddy is installed (1) or removed (0). **Note:** The 110L does not have an entry/exit port, so this value is 0.
EEPort Locked	The entry/exit port is locked (1) or unlocked (0). **Note:** The 110L does not have an entry/exit port, so this value is 0.
X-Axis Home	The robot is in the home position on the X axis (1) or not (0).
X-Axis EOT	The robot is at the EOT (end of travel) position on the X axis (1) or not (0).
Wrist Back	The robot wrist position is toward the back of the autoloader (1) or not (0).

Table 6-6 *Sensors (continued)*

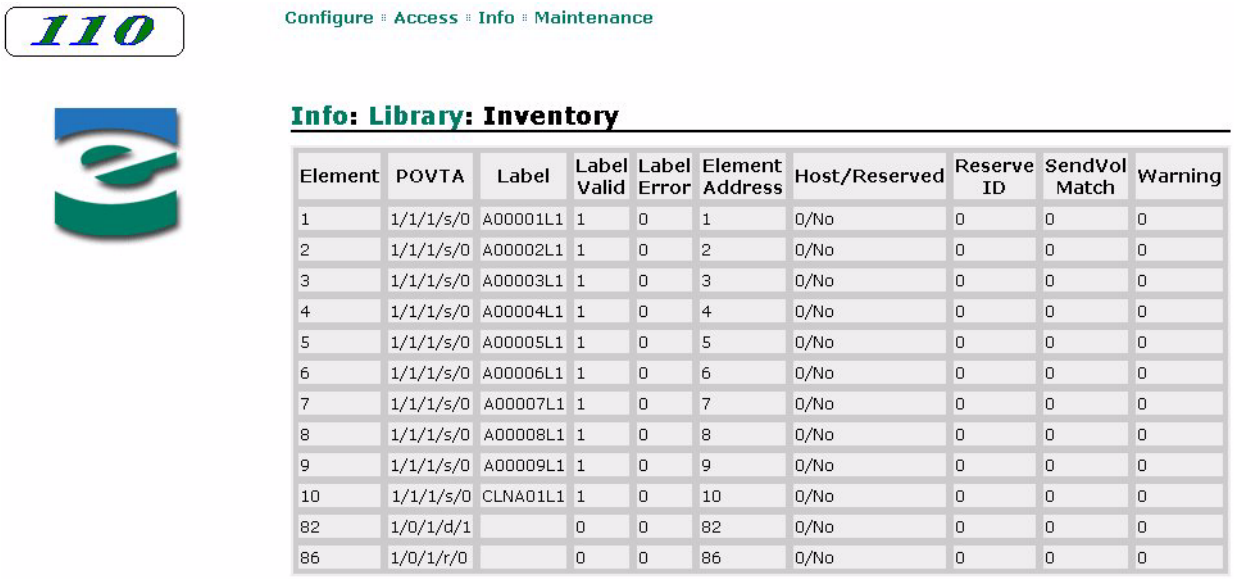
Sensor	Description
Wrist Front	The robot wrist position is toward the front of the autoloader (1) or not (0).
Drive Bay 1 Occupied	There is a drive installed in the drive bay (1) or the drive bay is empty (0).
Drive Bay 2 Occupied	N/A
Drive Bay 3 Occupied	N/A
Drive Bay 4 Occupied	N/A
Fan Good	The autoloader and tape drive fans are operational (1) or have failed (0). The sensors are shown in the following order: Autoloader/Drive 1/Drive 2/Drive 3/Drive 4. (Drive 2, Drive 3, and Drive 4 are not applicable.)

Viewing the Cartridge Inventory

The Library Inventory page allow you to view information the autoloader maintains for each element. See page 67 for information about the autoloader's cartridge inventory.

To view the cartridge inventory:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Inventory. A page similar to Figure 6-28 appears.



Element	POVTA	Label	Label Valid	Label Error	Element Address	Host/Reserved	Reserve ID	SendVol Match	Warning
1	1/1/1/s/0	A00001L1	1	0	1	0/No	0	0	0
2	1/1/1/s/0	A00002L1	1	0	2	0/No	0	0	0
3	1/1/1/s/0	A00003L1	1	0	3	0/No	0	0	0
4	1/1/1/s/0	A00004L1	1	0	4	0/No	0	0	0
5	1/1/1/s/0	A00005L1	1	0	5	0/No	0	0	0
6	1/1/1/s/0	A00006L1	1	0	6	0/No	0	0	0
7	1/1/1/s/0	A00007L1	1	0	7	0/No	0	0	0
8	1/1/1/s/0	A00008L1	1	0	8	0/No	0	0	0
9	1/1/1/s/0	A00009L1	1	0	9	0/No	0	0	0
10	1/1/1/s/0	CLNA01L1	1	0	10	0/No	0	0	0
82	1/0/1/d/1		0	0	82	0/No	0	0	0
86	1/0/1/r/0		0	0	86	0/No	0	0	0

Figure 6-28 *Remote management utility – Library Inventory page*

Table 6-7 describes the information on this page.

Table 6-7 *Inventory fields*

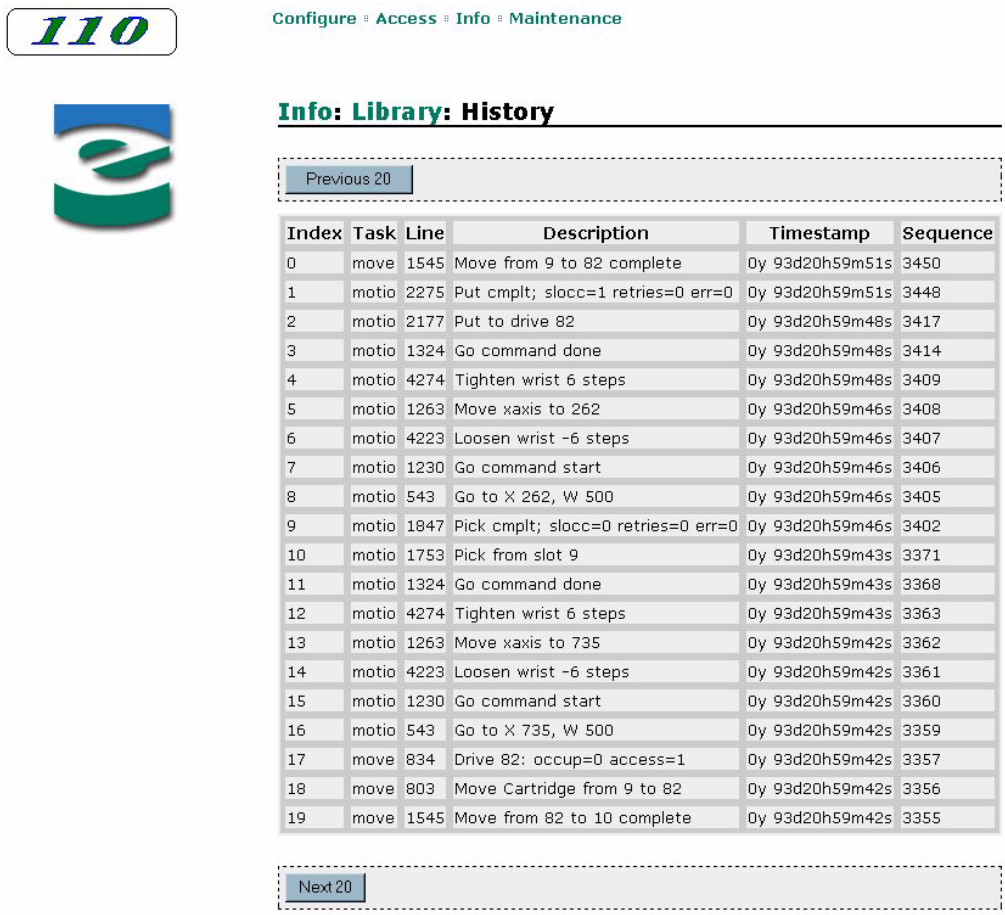
Field	Description
Element	The index of the element for which the information is being displayed. (See page 58 for element index number assignments.)
P (Present)	The tape drive or magazine is installed (1) or not (0).
O (Occupied)	The element contains a cartridge (1) or not (0).
V (Valid)	The Occupied field is accurate (1) or is questionable (0).
T (Type)	Indicates the type of element: s = cartridge slot d = tape drive r = robot
A (Accessible)	The tape drive is accessible (1) or not (0). The tape drive is accessible if it is installed in the drive bay and there is no cartridge loaded inside the drive. **Note:** This field applies only to tape drives. For all other elements, the value is 0.
Label	If the element contains a cartridge whose bar code label has been scanned, the Label field contains the bar code label contents.
Label Valid	The Label field is valid (1) or not (0).
Label Error	Displays 0 if the bar code scan was successful, or displays an error condition: 60 – The bar code scanner could not read the bar code label because there was no label on the cartridge. 62 – The bar code scanner could not read the label because the magazine is not present. 64 – The bar code scanner could not read the label because the label checksum is bad.
Element Address	The SCSI element address.
Host	The SCSI ID of the host that has reserved the element (if it is reserved). If the element is not reserved, this field is 0.
Reserved	Indicates whether the element is reserved by a host.
Reserve ID	The ID that the element is reserved under. This is a number assigned by a host when the reservation was made. If there is no reservation, this field is 0.
SndVol Match (Send Volume Match)	The cartridge label matched the template sent with the last SCSI SEND VOLUME TAG command (1) or did not match (0).
Warning	Displays 0 if there are no failures or errors associated with this element, or displays an error code. See Chapter 8 for a list of error codes and corrective actions.

Viewing the Library History

The Library History page lists the most recent 600 events that have occurred in the autoloader.

To view the history:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on History. A page similar to Figure 6-29 appears.



Index	Task	Line	Description	Timestamp	Sequence
0	move	1545	Move from 9 to 82 complete	0y 93d20h59m51s	3450
1	motio	2275	Put cmplt; slocc=1 retries=0 err=0	0y 93d20h59m51s	3448
2	motio	2177	Put to drive 82	0y 93d20h59m48s	3417
3	motio	1324	Go command done	0y 93d20h59m48s	3414
4	motio	4274	Tighten wrist 6 steps	0y 93d20h59m48s	3409
5	motio	1263	Move xaxis to 262	0y 93d20h59m46s	3408
6	motio	4223	Loosen wrist -6 steps	0y 93d20h59m46s	3407
7	motio	1230	Go command start	0y 93d20h59m46s	3406
8	motio	543	Go to X 262, W 500	0y 93d20h59m46s	3405
9	motio	1847	Pick cmplt; slocc=0 retries=0 err=0	0y 93d20h59m46s	3402
10	motio	1753	Pick from slot 9	0y 93d20h59m43s	3371
11	motio	1324	Go command done	0y 93d20h59m43s	3368
12	motio	4274	Tighten wrist 6 steps	0y 93d20h59m43s	3363
13	motio	1263	Move xaxis to 735	0y 93d20h59m42s	3362
14	motio	4223	Loosen wrist -6 steps	0y 93d20h59m42s	3361
15	motio	1230	Go command start	0y 93d20h59m42s	3360
16	motio	543	Go to X 735, W 500	0y 93d20h59m42s	3359
17	move	834	Drive 82: occup=0 access=1	0y 93d20h59m42s	3357
18	move	803	Move Cartridge from 9 to 82	0y 93d20h59m42s	3356
19	move	1545	Move from 82 to 10 complete	0y 93d20h59m42s	3355

Figure 6-29 *Remote management utility – Library History page*

Click on the Next 20 and Previous 20 buttons to scroll through the events.

Table 6-8 describes the information on this page.

Table 6-8 *History information*

Field	Description
Index	The number of the event within the history buffer. The range is 0 (the most recent event) through 599. The most recent event is displayed first.
Task	The process that logged the event.
Line	The line number of the source code that logged the event.
Description	A description of the event.
Timestamp	The time, according to the autoloader's internal clock, that the event took place.
Sequence	The sequence number of the event across all system buffers.

VIEWING TAPE DRIVE INFORMATION

From the Tape Drive Info page, you can view status information about the tape drive, including its serial number, code level, and operational status.

To view tape drive information:

1. Click on Info at the top of the page.
2. Click on Tape drive information. A page similar to Figure 6-30 appears.

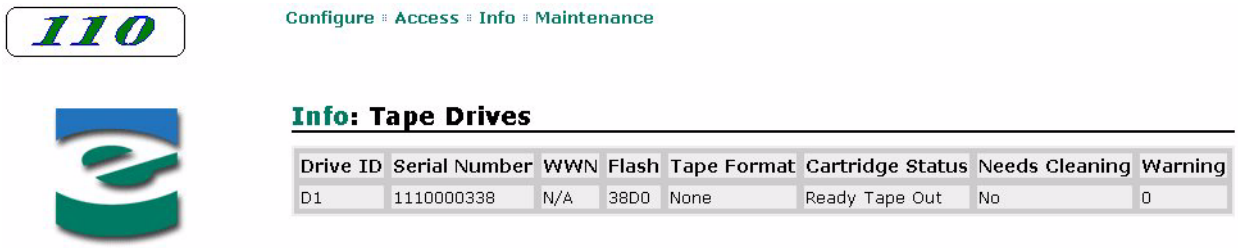


Figure 6-30 *Remote management utility – Tape Drive Information page*

Table 6-9 describes the information on this page.

Table 6-9 *Tape drive information fields*

Field	Description
Drive ID	D1 is the tape drive.
Serial Number	The tape drive's serial number.
WWN	The tape drive's world wide name (applicable only to Fibre Channel tape drives).
Flash	The code level of the tape drive's flash EEPROM.
Tape Format	The data format of the cartridge currently in the tape drive.

Table 6-9 *Tape drive information fields (continued)*

Field	Description
Cartridge Status	The status of the cartridge, if any, in the tape drive: ▪ Empty ▪ Ready No Tape ▪ Loading ▪ Ready Tape ▪ Reading ▪ Writing ▪ Tape in Motion ▪ Unloading ▪ Ready Tape Out ▪ Error ▪ Clean Drive ▪ No Comm ▪ Cleaning ▪ Unknown
Needs Cleaning	Indicates whether the drive needs cleaning.
Warning	Displays 0 if the drive is free of errors, or displays an error code. For information about LTO Ultrium error codes, refer to the LTO Ultrium tape drive documentation available from IBM Corporation or visit www.storage.ibm.com/tape/lto/oem/index.html.

ISSUING AUTOLOADER AND TAPE DRIVE COMMANDS

From the remote management utility, you can issue individual commands to the autoloader and tape drive, run demos, perform diagnostic tests, calibrate the autoloader, and reset the autoloader and tape drive.

The commands are available from the Maintenance page. Click on Maintenance at the top of the page to view the Maintenance page. Figure 6-31 shows the Maintenance page.

Figure 6-31 *Remote management utility – Maintenance page*

From the Maintenance page, you can make the following selections:

- **Run the library in demo mode** – Set options for running the autoloader in a continuous demo mode, where the robot randomly moves cartridges between slots.
- **Run individual library commands** – Issue commands to run the autoloader's self test, position the robot to specific locations, scan bar code labels, and move cartridges.

- **Perform library diagnostic tests** – Test individual autoloader functions.
- **Run individual tape drive commands** – Issue commands to clean the tape drive and unload a cartridge from the tape drive.
- **Calibrate library elements** – Calibrate components in the autoloader.
- **Reset the library and/or tape drive** – Reset the autoloader and tape drive.

RUNNING AUTOLOADER DEMOS

To run a demo:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Run the library in demo mode. A page similar to Figure 6-32 appears.

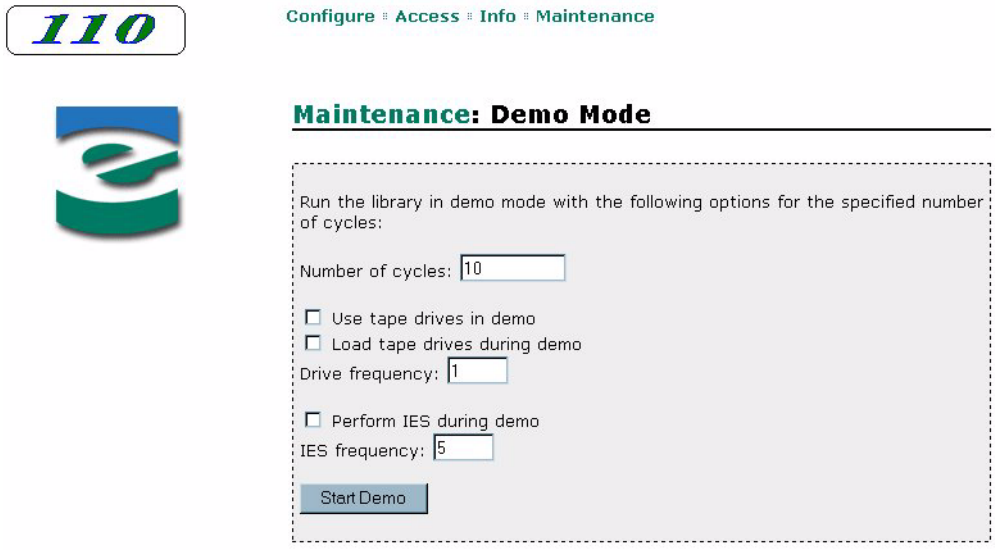

110
Configure Access Info Maintenance
Maintenance: Demo Mode
Run the library in demo mode with the following options for the specified number of cycles:
Number of cycles: 10
Use tape drives in demo
Load tape drives during demo
Drive frequency: 1
Perform IES during demo
IES frequency: 5
Start Demo

Figure 6-32 *Remote management utility – Demo Mode page*

4. Enter the number of cycles for the demo.
5. If you want the tape drive used in the demo, check the Use tape drives in demo box.
6. If you want tapes loaded into the tape drive, check the Load tape drives during demo box. Specify how often you want tapes loaded in the drive in the Drive Frequency box.
7. If you want cartridge inventories performed during the demo, check the Perform IES during demo box. (IES is Initialize Element Status, the SCSI command that performs a cartridge inventory.) Specify how often you want a cartridge inventory performed in the IES frequency box.

8. Click on the Start Demo button.

   Note: If you want to stop a demo in progress, click on the Stop button.

9. When the demo is finished, return the autoloader to its original control mode.

ISSUING AUTOLOADER COMMANDS

You can issue the following commands to the autoloader:

- **Self test** – Runs the autoloader's self test. During the self test, the robot moves to the tape drive, rotates 180 degrees, moves to slot 1, rotates 180 degrees, then returns to the tape drive.
- **Position to element** – Moves the robot to a position you specify (in front of the tape drive, a fixed cartridge slot, or a magazine slot).
- **Park robot** – Moves the robot to the right side of the autoloader, rotated toward the back (facing the tape drive). This position allows the packing material to be placed on the robot for shipping.
- **Home robot** – Moves the robot to its home position.
- **Scan bar code labels** – Causes the robot to scan the bar code labels on the cartridges in the range of locations you specify.
- **Move cartridge** – Causes the robot to move a cartridge from the source and destination you specify.

Running the Autoloader Self Test

To run the autoloader's self test:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.
4. Click on Self test.
5. Click on the Self Test button to begin the test.
6. When the test is finished, return the autoloader to its original control mode.

Positioning the Robot to an Element

To position the robot to an element:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.

3. Click on Run individual library commands.
4. Click on Position to element. A page similar to Figure 6-33 appears.

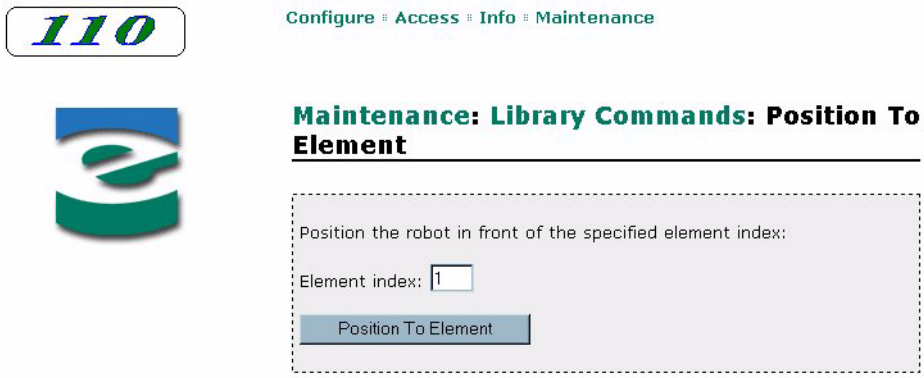

110
Configure | Access | Info | Maintenance
Maintenance: Library Commands: Position To Element
Position the robot in front of the specified element index:
Element index: 1
Position To Element

Figure 6-33 *Remote management utility – Position to Element page*

5. Specify the destination for the robot in the Element index box. See page 58 for element index number assignments.
6. Click on the Position To Element button.
7. When finished, return the autoloader to its original control mode.

Parking the Robot

To park the robot:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.
4. Click on Park robot.
5. Click on the Park button.

Homing the Robot

To move the robot to its home position:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.
4. Click on Home robot.
5. Click on the Home button.
6. When finished, return the autoloader to its original control mode.

Scanning Bar Code Labels

To scan bar code labels:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.
4. Click on Scan bar code labels. A page similar to Figure 6-34 appears.

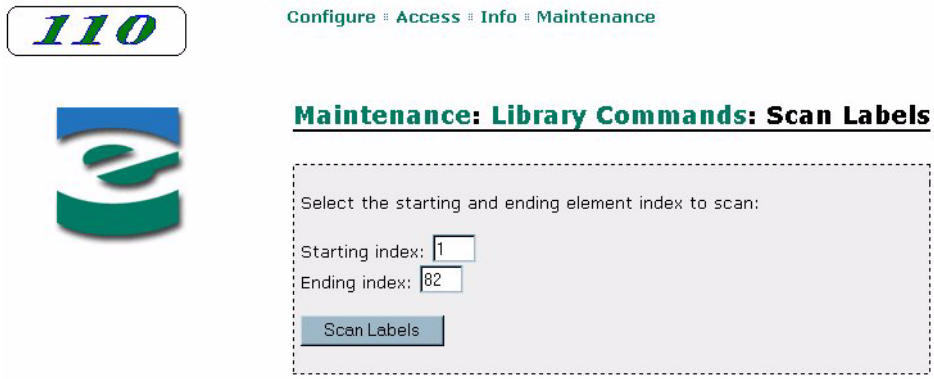


Figure 6-34 *Remote management utility – Scan Labels page*

5. Specify the range of locations to scan in the Starting index and Ending index boxes. See page 58 for element index number assignments.
6. Click on the Scan Labels button.
7. When finished, return the autoloader to its original control mode.

Moving a Cartridge

To move a cartridge:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.

4. Click on Move cartridge. A page similar to Figure 6-35 appears.

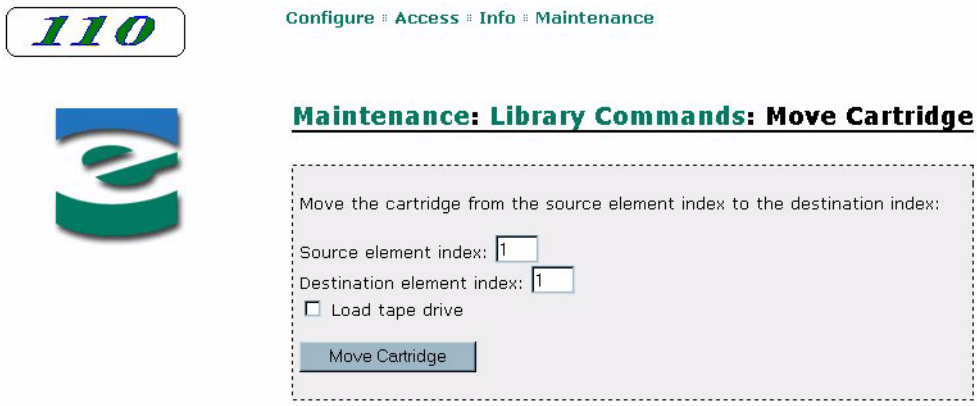

110
Configure | Access | Info | Maintenance
Maintenance: Library Commands: Move Cartridge
Move the cartridge from the source element index to the destination index:
Source element index: 1
Destination element index: 1
Load tape drive
Move Cartridge

Figure 6-35 *Remote management utility – Move Cartridge page*

5. Specify the source and destination for the move in the Source element index and Destination element index boxes. See page 58 for element index number assignments.

6. If the destination is the tape drive and you want the cartridge loaded into the drive, check the Load tape drive box.

! **Important** If you insert a data cartridge into the tape drive, be aware that the drive will not automatically eject the data cartridge. However, if you insert a cleaning cartridge into the tape drive, the cartridge will be ejected when the cleaning is finished.

---

7. Click on the Move Cartridge button.

8. When finished, return the autoloader to its original control mode.

RUNNING DIAGNOSTIC TESTS

You can perform the following diagnostic tests to check individual autoloader functions:

- **Continuously scan bar code labels** – The robot scans all of the cartridge slots.
- **Continuously pick and place a cartridge** – The robot takes a cartridge from a specified element and replaces it in the same location.
- **Continuously cycle an axis** – The robot moves on the specified axis: X axis (robot moves right and left), Wrist (robot rotates from front to back), and Picker (the robot's cartridge gripper moves in and out without a cartridge).
- **Continuously cycle a solenoid** – The solenoid that locks the door opens and closes.

Continuously Scanning Bar Code Labels

To test bar code label scanning:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Perform library diagnostic tests.
4. Click on Continuously scan bar code labels. A page similar to Figure 6-36 appears.

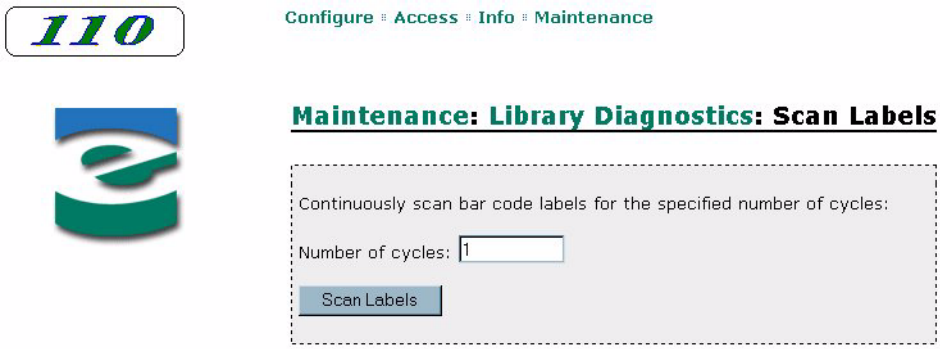

Configure Access Info Maintenance
Maintenance: Library Diagnostics: Scan Labels
Continuously scan bar code labels for the specified number of cycles:
Number of cycles: 1
Scan Labels

Figure 6-36 *Remote management utility – Scan Labels Diagnostics page*

5. Specify the number of cycles for the test.
6. Click on the Scan Labels button.

   Note: To stop a test in progress, click on the Stop button.

7. When finished, return the autoloader to its original control mode.

Continuously Picking and Placing a Cartridge

To test cartridge picking and placing:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Perform library diagnostic tests.

4. Click on Continuously pick and place a cartridge. A page similar to Figure 6-37 appears.

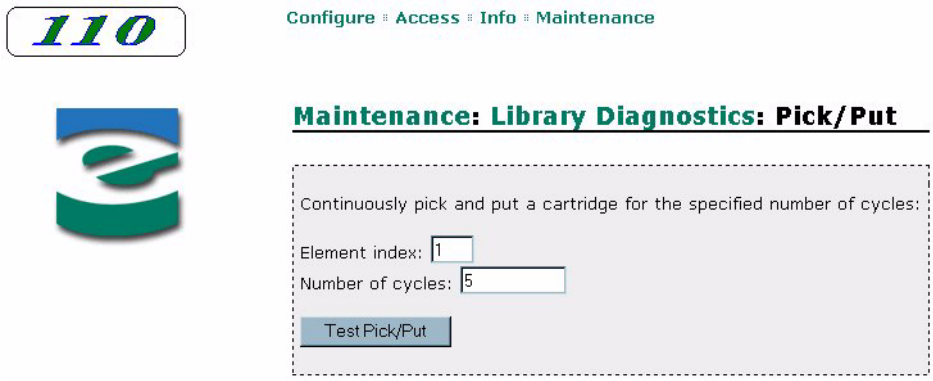

110
Configure | Access | Info | Maintenance
Maintenance: Library Diagnostics: Pick/Put
Continuously pick and put a cartridge for the specified number of cycles:
Element index: 1
Number of cycles: 5
Test Pick/Put

Figure 6-37 *Remote management utility – Pick/Put Diagnostics page*

5. Specify the location of the cartridge in the Element Index box. See page 58 for element index number assignments.
6. Specify the number of cycles for the test.
7. Click on the Test Pick/Put button.

   Note: To stop a test in progress, click on the Stop button.

8. When finished, return the autoloader to its original control mode.

Continuously Cycling an Axis

To test a robot axis:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Perform library diagnostic tests.

4. Click on Continuously cycle an axis. A page similar to Figure 6-38 appears.

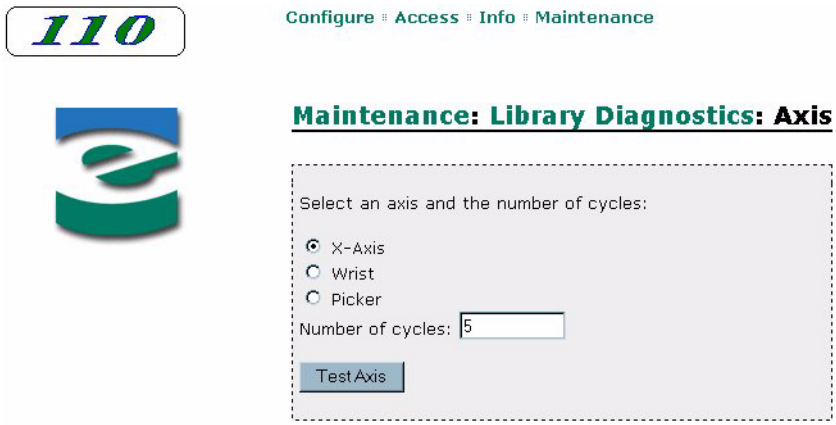


Figure 6-38 *Remote management utility – Axis Diagnostics page*

5. Click on the radio button next to the axis you want to test.
6. Specify the number of cycles for the test.
7. Click on the Test Axis button.

   Note: To stop a test in progress, click on the Stop button.

8. When finished, return the autoloader to its original control mode.

Continuously Cycling a Solenoid

To test a solenoid:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Perform library diagnostic tests.

4. Click on Continuously cycle a solenoid. A page similar to Figure 6-39 appears.

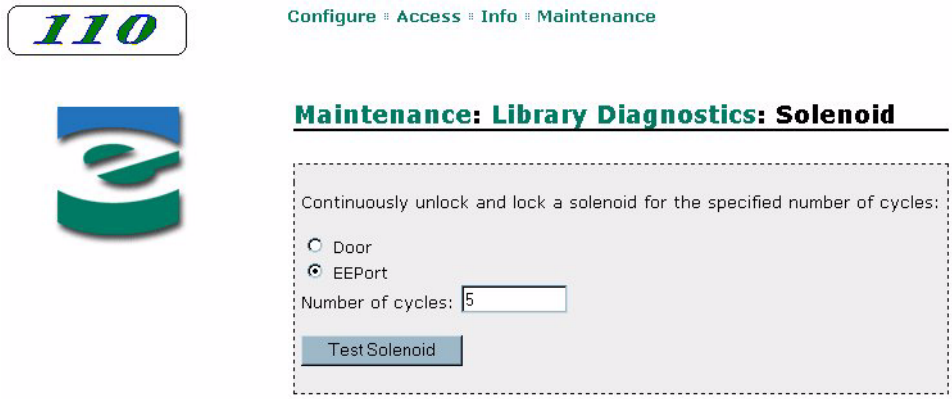

110
Configure | Access | Info | Maintenance
Maintenance: Library Diagnostics: Solenoid
Continuously unlock and lock a solenoid for the specified number of cycles:
Door
EEPort
Number of cycles: 5
Test Solenoid

Figure 6-39 *Remote management utility – Solenoid Diagnostics page*

5. Click on the radio button next to Door.

   Note: The EEPort option is not applicable to the 110L.

6. Specify the number of cycles for the test.
7. Click on the Test Solenoid button.

   Note: To stop a test in progress, click on the Stop button.

8. When finished, return the autoloader to its original control mode.

ISSUING TAPE DRIVE COMMANDS

You can issue the following commands to the tape drive:

- **Clean a tape drive** – Cleans the tape drive by inserting a cleaning cartridge into the drive and removing the cartridge when the cleaning is finished.
- **Unload a tape drive** – Unloads a cartridge from the tape drive.

Cleaning the Tape Drive

If the tape drive requires cleaning and you are not using the autoloader's Autoclean option (see page 90), you can issue a command to clean the tape drive using a cleaning cartridge stored in the autoloader.

To use this cleaning method, make sure that you have:

- Installed a cleaning cartridge in the appropriate slot. See page 15.
- Activated the cleaning cartridge slot. See page 90.
- Specified the number of cleaning cycles available on the cleaning cartridge. See page 90.
- Turned off the Autoclean Option. See page 90.

To clean the tape drive:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Run individual tape drive commands.
4. Click on Clean a tape drive. A page similar to Figure 6-40 appears.

Figure 6-40 *Remote management utility – Tape Drive Cleaning page*

5. Click on the radio button next to D1.
6. Click on the Clean button. The robot places the cleaning tape in the tape drive. After the cleaning is finished, the robot returns the cleaning tape to its slot.

! Important If the tape drive ejects the cleaning cartridge immediately after loading it, you need to replace the cleaning cartridge. To order cleaning cartridges, contact Exabyte (see page iv).

7. When finished, return the autoloader to its original control mode.

Unloading the Tape Drive

Under normal circumstances, cartridges are automatically unloaded (ejected) from the tape drive. However, if a tape drive problem occurs that requires intervention, you may need to unload a cartridge by issuing a command to the drive.

To unload the tape drive:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Run individual tape drive commands.

4. Click on Unload a tape drive. A page similar to Figure 6-41 appears.

Figure 6-41 *Remote management utility – Unload Tape Drive page*

5. Click on the radio button next to D1.
6. Click on the Unload button. The cartridge is ejected from the tape drive.

   Note: To move the cartridge to a cartridge slot, use the Move Cartridge command (see page 110).

7. When finished, return the autoloader to its original control mode.

CALIBRATING AUTOLOADER ELEMENTS

Under normal operating conditions, you do not need to calibrate the autoloader. However, if a problem occurs, you may be asked by Exabyte Technical Support personnel to calibrate the autoloader as part of a troubleshooting procedure. You can calibrate the entire autoloader or just the tape drive.

Calibrating the Autoloader

To calibrate the entire autoloader:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Calibrate library elements.
4. Click on Calibrate the library.
5. Click on the Calibrate Library button to begin calibration.
6. When calibration is complete, return the autoloader to its original control mode.

Calibrating the Tape Drive

To calibrate the tape drive:

1. Set the autoloader's control mode to Remote (see page 78).
2. Click on Maintenance at the top of the page.
3. Click on Calibrate library elements.
4. Click on Calibrate a tape drive. A page similar to Figure 6-42 appears.

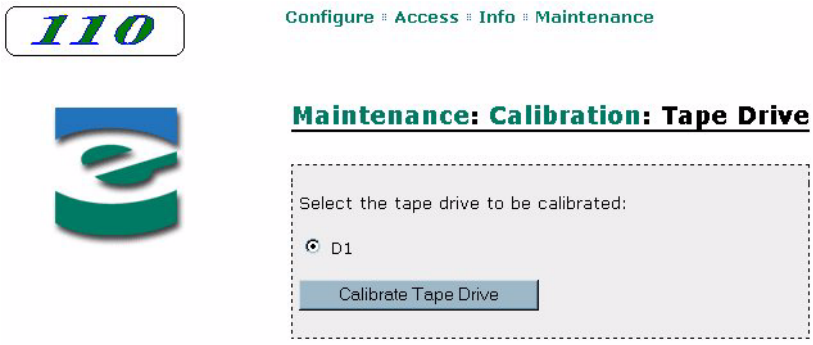


Figure 6-42 *Remote management utility – Tape Drive Calibration page*

5. Click on the radio button next to D1.
6. Click on the Calibrate Tape Drive button to begin calibration.
7. When calibration is complete, return the autoloader to its original control mode.

RESETTING THE AUTOLOADER AND TAPE DRIVE

If the autoloader or tape drive has encountered an error and is not operating as expected after you have tried the recommended corrective actions, you may need to reset the autoloader or the tape drive.

Resetting the autoloader causes it to perform its power-on self-test and a full cartridge inventory. If the autoloader is performing a cartridge move operation when it is reset, it completes the move operation before it performs the power-on self-test.

Resetting the tape drive causes the drive to perform its power-on self-test and rewind any loaded tape to the beginning.

! Important After the tape drive is reset, the drive rewinds the tape but does not eject the cartridge. Make sure that it is safe to overwrite the tape before performing a backup so that you don't lose previously recorded data.

Caution Before resetting, make sure the autoloader and tape drive are not communicating across the SCSI bus. The reset may disrupt communications on the SCSI bus.

Resetting the Autoloader

To reset the autoloader:

1. Click on Maintenance at the top of the page.
2. Click on Reset the library and/or tape drives.
3. Click on Reset the library. A page similar to Figure 6-43 appears.

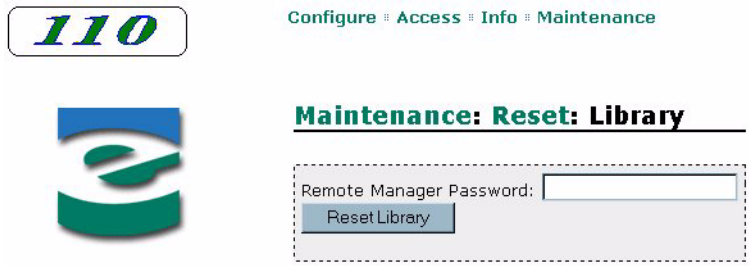


Figure 6-43 *Remote management utility – Reset Library page*

4. If necessary, enter the remote manager password (see page 89).
5. Click on the Reset Library button. The autoloader performs the reset operation.

Resetting the Tape Drive

To reset the tape drive:

1. Click on Maintenance at the top of the page.
2. Click on Reset the library and/or tape drives.
3. Click on Reset a tape drive. A page similar to Figure 6-44 appears.

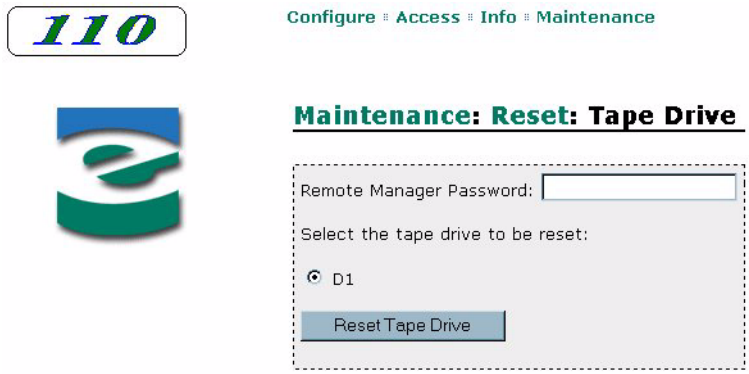


Figure 6-44 *Remote management utility – Reset Tape Drive page*

4. If necessary, enter the remote manager password (see page 89).
5. Click on the radio button next to D1.
6. Click on the Reset Tape Drive button. The autoloader performs the reset operation.

7 MAINTENANCE

This chapter describes basic autoloader maintenance tasks that you can perform on-site without the aid of a service technician. These tasks include:

- Replacing the tape drive
- Cleaning the autoloader
- Using touch-up paint on the housing
- Upgrading firmware and creating diagnostic listings

Caution Unless you have a self-maintenance contract with Exabyte, do not attempt to replace any components in the autoloader, other than the tape drive. If you do so, you will void your warranty.

REPLACING THE TAPE DRIVE

This section describes how to replace the tape drive. You can order a tape drive from Exabyte (see page iv). The tape drive will be shipped to you in the required drive carrier. You cannot install a tape drive into the autoloader without a drive carrier

PREPARING FOR REPLACEMENT

1. Obtain a #2 Phillips screwdriver.
2. Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use an antistatic mat and grounded static protection wristband during installation. If a mat and wristband are not available, touch a known grounded surface, such as a computer's metal chassis.
3. Power off the autoloader and disconnect the power cord.

Warning Before performing this procedure, be sure that the autoloader's power switch is in the off position and the power cord is disconnected from the outlet.

REMOVING THE TAPE DRIVE

1. Disconnect the SCSI cable(s) and terminator, if present, from the back of the tape drive. The SCSI connectors for the tape drive are accessible from the back panel (see Figure 7-1).

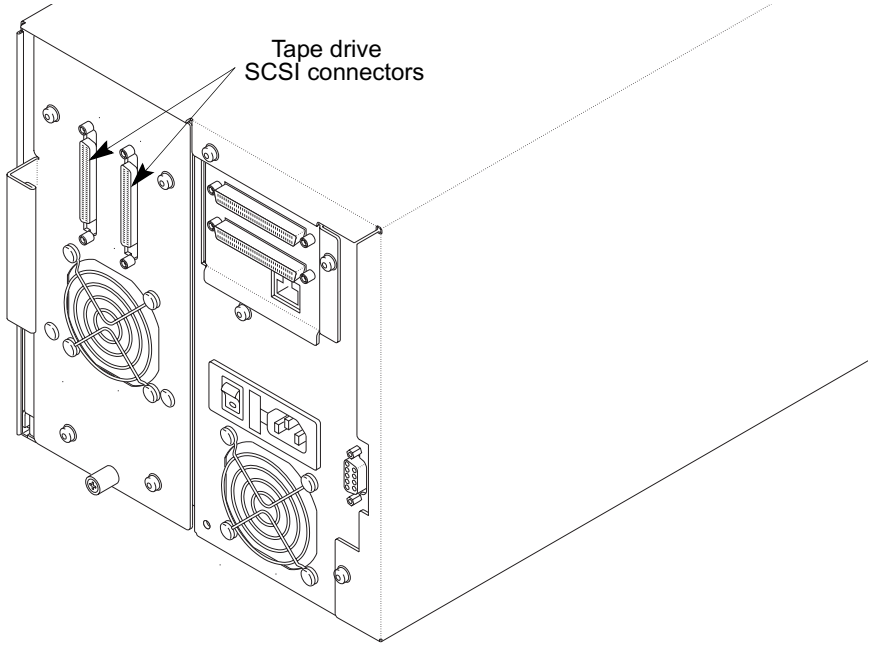


Figure 7-1 *Location of tape drive SCSI connectors*

2. From the back panel, use a #2 Phillips screwdriver to release the captive screw that secures the tape drive carrier to the autoloader (see Figure 7-2).

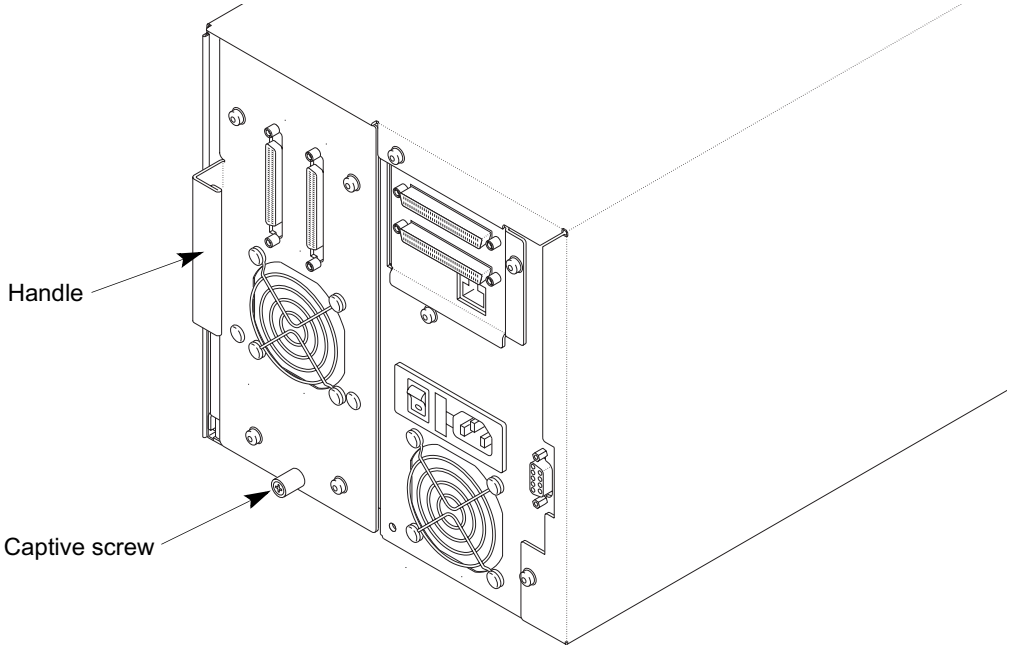


Figure 7-2 *Location of captive screw and drive carrier handle*

3. Remove the drive carrier by grasping the handle and pulling it directly out of the autoloader.

Important The drive carrier weighs 4.5 kg (10 pounds); make sure you support the bottom of the carrier as you remove it.

INSTALLING THE NEW TAPE DRIVE

1. Insert the tape drive so that the handle is at the left and the fan is at the bottom, as shown in Figure 7-3. The tape drive should slide easily toward the front of the autoloader.

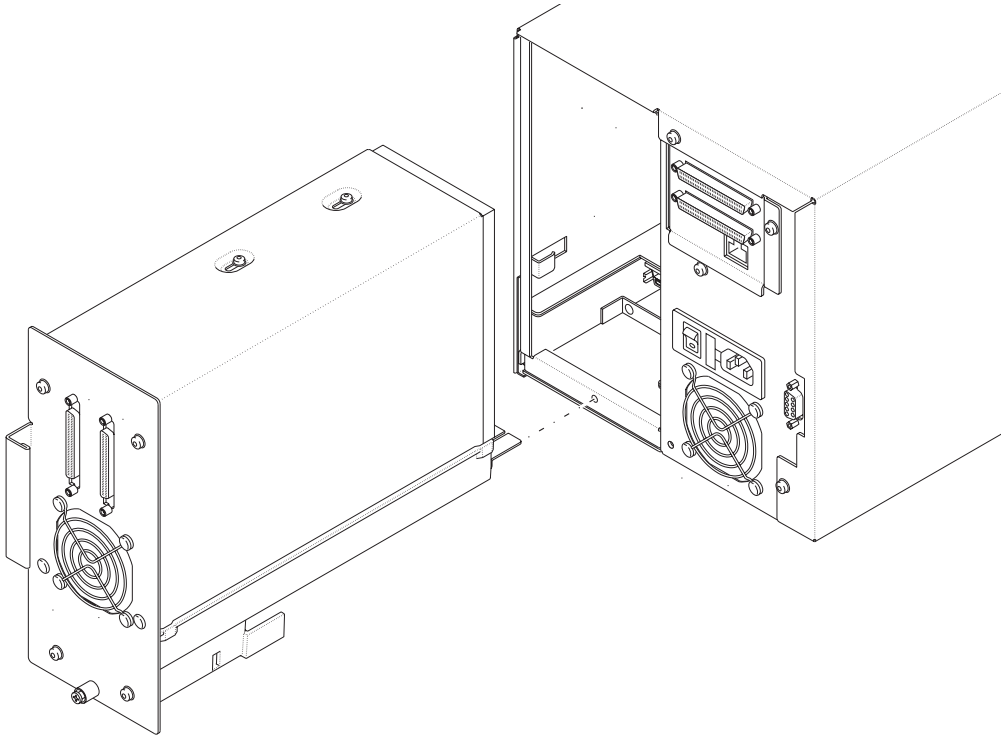


Figure 7-3 *Sliding the tape drive into the autoloader*

2. Tighten the captive screw to 8.0 inch-pounds (9.2 kg-cm) of torque.
3. Connect the SCSI cables (or cable and terminator) to the new tape drive.

Caution To avoid damaging the tape drive, make sure the autoloader is powered off when you connect it to the SCSI bus.

4. Reconnect the power cord and power on the autoloader, as described on page 20. Calibration of the new tape drive occurs automatically during power on.

The autoloader is now ready to resume operation. The new tape drive automatically assumes the SCSI ID of the old drive. You may want to perform some hardware exercises to ensure that the autoloader and the newly installed tape drive are communicating correctly (see page 58).

CLEANING THE AUTOLOADER

Caution The autoloader's internal components are lubricated at the factory and should not be cleaned or relubricated. To protect the internal components from dust, keep the autoloader's door closed.

The only autoloader components that should be cleaned are the tape drive and the operator panel. Instructions for cleaning the tape drive are provided on page 53. To clean the operator panel, use wipes or cleaners appropriate for LCD screens or computer monitors.

Caution To avoid scratching the operator panel, do not use abrasive cleaners, abrasive cleaning implements, harsh chemicals, or solvents.

USING TOUCH-UP PAINT ON THE HOUSING

A paint kit is available for touching up nicks and scratches on the finish. For ordering information, contact Exabyte (see page iv).

UPGRADING AUTOLOADER FIRMWARE AND CREATING DIAGNOSTIC LISTINGS

The autoloader features an internal interface that provides access to the autoloader's firmware. You access this interface, called Console, through the autoloader's serial port. You can use Console to upgrade the autoloader's firmware, create diagnostic listings, and view the password for LCD security.

As an alternative, if your autoloader is equipped with the Ethernet option, you can use an FTP utility to upgrade the autoloader's firmware and create diagnostic listings.

This section describes how to do the following:

- Connect to the autoloader's Console interface
- Upgrade autoloader firmware via Console
- Create a diagnostic listing via Console
- View the LCD security password via Console
- Connect to the autoloader's FTP interface
- Upgrade autoloader firmware via FTP
- Create a diagnostic listing via FTP

CONNECTING TO THE AUTOLOADER'S CONSOLE INTERFACE

To access Console, you must have the following:

- A host computer that uses an RS232 serial port
- A straight-through 9-pin serial cable (not a null modem cable)
- Terminal emulation software, such as HyperTerminal

Note: Exabyte recommends using HyperTerminal, a standard communications package available with Microsoft Windows®.

Connecting the Serial Cable

Connect the 9-pin cable to a serial port on the host computer and to the serial port on the back of the autoloader. Figure 7-4 shows the location of the serial port.

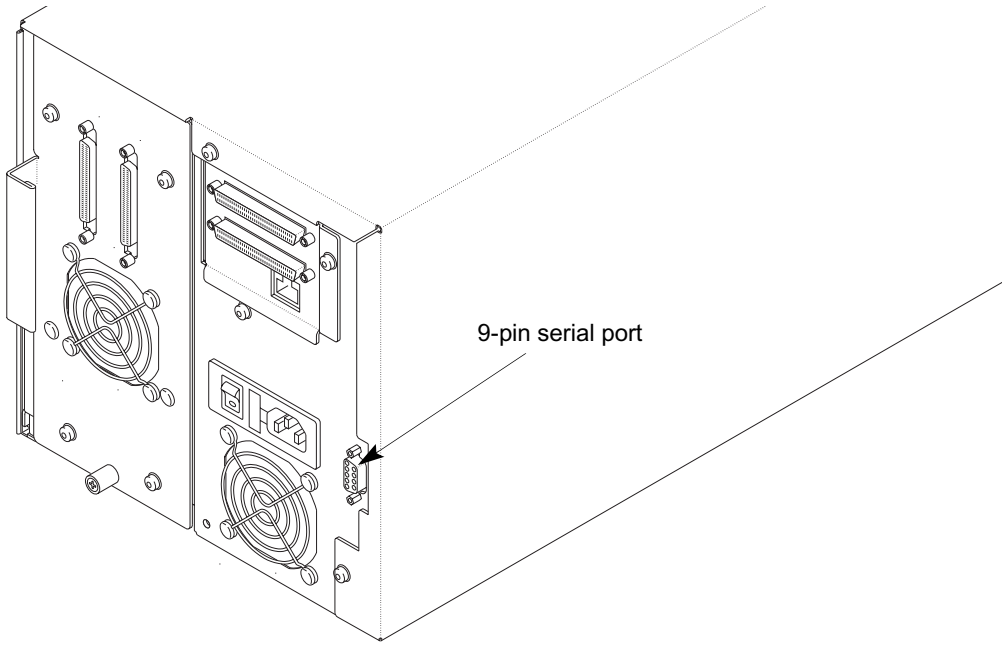


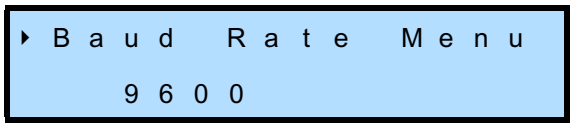
Figure 7-4 *Location of serial port*

Setting the Autoloader's Baud Rate

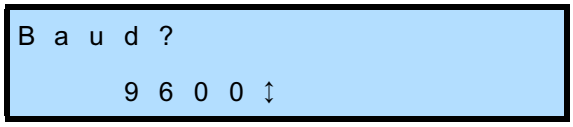
Before accessing Console, you may need to change the baud rate for the autoloader so that it matches the host computer's baud rate. The autoloader's default rate is 9600.

To change the baud rate:

1. Press MENU to display the menus. Press the down arrow key until "Config Menu" appears, then press ENTER. The Baud Rate Menu displays the currently selected baud rate.



2. Press ENTER. An informational message appears, then the following screen appears.



3. Use the up or down arrow key to select the baud rate that matches the baud rate of the host computer, then press ENTER.

Accessing Console using HyperTerminal

Note: These instructions assume you are using HyperTerminal, a communications package available with Microsoft Windows. If desired, you can use a different terminal emulation software package.

To access Console using HyperTerminal:

1. From your computer, launch HyperTerminal.
2. In HyperTerminal's Connection Description screen, enter a name and choose an icon for this communications session.
3. In HyperTerminal's Connect To screen, choose the communications port you are using from the Connect Using field. Click OK.
4. In the Properties screen, make sure the fields contain the following values, then click OK.

   - Bits per second: (baud rate of the autoloader)
   - Data bits: 8
   - Parity bits: none
   - Stop bits: 1
   - Flow control: none

5. Check the ASCII setup from HyperTerminal:

   a. From the File menu, select Properties.

   b. In the Properties screen, select the Settings tab.

   c. In the Emulation mode field, select "ANSI."

   d. Click on the ASCII Setup button.

   e. In the ASCII Setup screen, make sure none of the boxes have check marks. Uncheck the boxes, if necessary.

   f. Click OK in the ASCII Setup screen.

   g. Click OK again in the Properties screen.

6. The Console program should now appear in HyperTerminal's main window. If necessary, type `redraw` and press Enter to refresh the screen.

7. If desired, type `help` and then press Enter to display Console's Help screen, as shown in Figure 7-5.

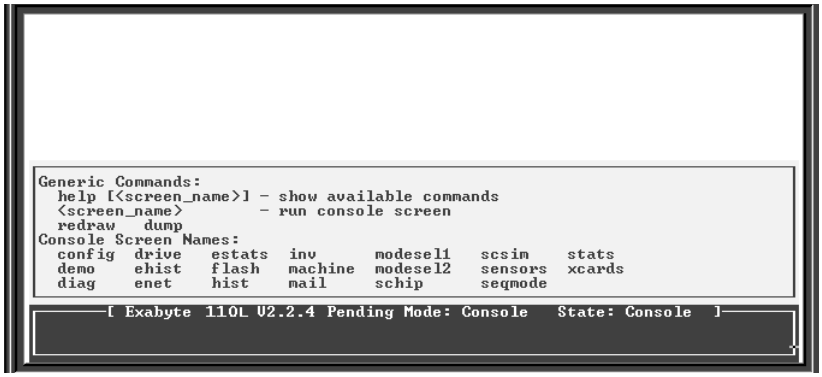

Generic Commands:
help [<screen_name>] - show available commands
<screen_name> - run console screen
redraw dump
Console Screen Names:
config drive estats inv modesel1 scsim stats
demo ehist flash machine modesel2 sensors xcards
diag enet hist mail schip seqmode
[Exabyte 110L V2.2.4 Pending Mode: Console State: Console]

Figure 7-5 *Console Help screen*

Note: If garbled characters or no characters appear on the screen, make sure you have the same baud rate set for the host as you do for the autoloader.

UPGRADING AUTOLOADER FIRMWARE VIA CONSOLE

Caution Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your autoloader inoperable. Consult with Exabyte Technical Support (see page iv) before performing an upgrade.

To upgrade the autoloader's firmware using the Console interface:

1. Obtain new firmware for the autoloader. You can download new firmware from Exabyte's web site (www.exabyte.com), or you can contact Exabyte Technical Support.
2. Access Console by following the steps on page 125.
3. If desired, you can use the SCSI READ BUFFER command to copy the current firmware to a disk. To do this, use a software application that can issue SCSI commands. For more information about the SCSI commands, refer to the *Exabyte 110L, 215, 221L, and 430 SCSI Reference*.
4. From Console, type `flash` and press Enter. This displays the Flash screen, as shown in Figure 7-6.

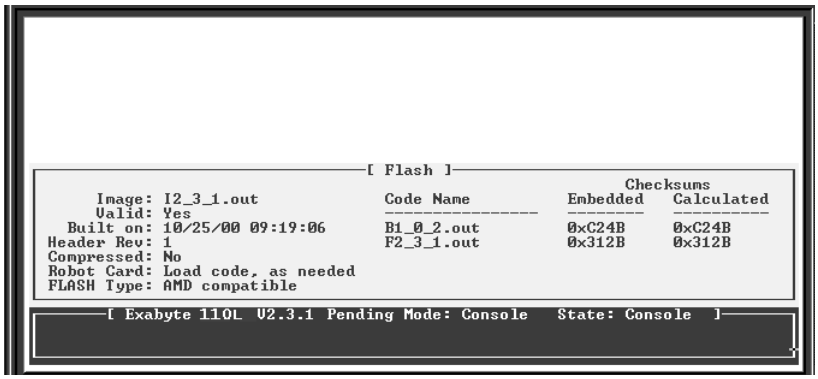


Figure 7-6 *Console Flash screen*

5. In the Flash screen, type `loadimage` and press Enter.
6. Use your terminal emulation software to specify the source location (path and filename) of the new firmware. For HyperTerminal, follow these steps:
   a. Select the Transfer menu.
   b. Select Send File.
   c. In the Send File screen, enter the path and file name of the firmware or click on the Browse button to locate the file. Select XModem as the protocol.
   d. Click on Send.

The system initiates the firmware upgrade and displays its progress on the screen. When the upgrade is successfully complete (in about four to five minutes), the autoloader automatically performs a power-on reset.

Caution Do not attempt to perform autoloader operations or power down the autoloader until after it automatically resets.

CREATING A DIAGNOSTIC LISTING VIA CONSOLE

If you report a problem to Exabyte Technical Support, you may be asked to create a diagnostic listing (also called a *dump*) via the Console interface. A diagnostic listing is created when you use a terminal emulation program (such as HyperTerminal) to send an ASCII text copy of the diagnostic buffer from the autoloader to the host computer. This information can be used by support personnel to troubleshoot incidents with the autoloader.

Note: These instructions assume you are using HyperTerminal, a communications package available with Microsoft Windows. If desired, you can use a different terminal emulation software package.

To create a diagnostic listing via Console:

1. Access Console by following the steps on page 125.
2. Type `dump` and press **Enter**.
3. Select the Transfer menu, then select Capture Text.
4. In the Capture Text screen, enter the path and filename for the ASCII text file and press Enter.
5. Press Enter again to start transferring the ASCII text file.
6. When the transfer is complete, select the Transfer menu, then select Capture Text and Stop.

VIEWING THE LCD SECURITY PASSWORD VIA CONSOLE

You can view the password for LCD security (described on page 41) from the Configuration Information screen in the Console interface.

To view the LCD security password:

1. Access Console by following the steps on page 125.
2. Type `config` and press Enter. The Configuration Information screen appears, as shown in Figure 7-7. The password appears next to the LCD password field.

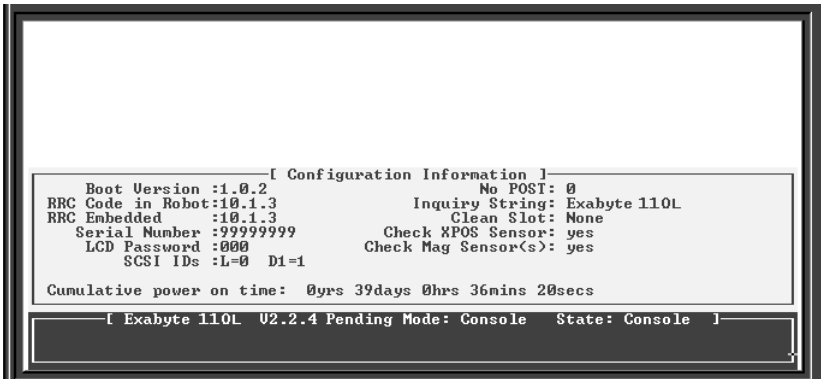

[Configuration Information]
Boot Version :1.0.2
No POST: 0
RRC Code in Robot:10.1.3
Inquiry String: Exabyte 110L
RRC Embedded :10.1.3
Clean Slot: None
Serial Number :99999999
Check XPOS Sensor: yes
LCD Password :000
Check Mag Sensor(s): yes
SCSI IDs :L=0 D1=1
Cumulative power on time: 0yrs 39days 0hrs 36mins 20secs
[Exabyte 110L V2.2.4 Pending Mode: Console State: Console]

Figure 7-7 *Console Configuration Information screen*

CONNECTING TO THE AUTOLOADER'S FTP INTERFACE

This section describes how to connect your autoloader to a host computer and use an FTP utility to upgrade firmware or create a diagnostic listing.

To use an FTP utility with the autoloader, you must have the following:

- A Category 5 (100BaseT connection) data-grade cable
- Software that supports RFC 959 file transfer protocol
- A host computer or network connection that uses a pin-through-hole RJ-45 shielded Ethernet connector

To access the autoloader's FTP interface:

1. Connect the Ethernet cable as described on page 19, and set Ethernet configuration options as described on page 31. Make a note of the autoloader's IP address.
2. From your host computer, activate the FTP utility you are going to use. Connect to the autoloader using the autoloader's current IP address.

3. Log into the autoloader's FTP interface using the FTP user name and password you set during autoloader configuration (see page 34). If you did not set an FTP user name and password for the autoloader, use the defaults:

   User name: *anonymous*
   Password: *Exabyte*

   Note: The user name and password are case-sensitive.

UPGRADING AUTOLOADER FIRMWARE VIA FTP

Caution Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your autoloader inoperable. Consult with Exabyte Technical Support (see page iv) before performing an upgrade.

To upgrade the autoloader's firmware via FTP:

1. Obtain new firmware for the autoloader. You can download new firmware from Exabyte's web site (www.exabyte.com), or you can contact Exabyte Technical Support.
2. Connect to the autoloader's FTP interface by following the instructions in the previous section.
3. Us the `ls` command to list the files on the autoloader.
4. If desired, you can make a copy of the current firmware by using a `get` FTP command.
5. Use the FTP command for your utility to transfer the new firmware to the autoloader. For example, issue `put filename.out`, where "`filename.out`" is the name of the new firmware.

The system initiates the firmware upgrade and displays its progress on the autoloader's LCD. When the upgrade has completed successfully, the autoloader automatically resets.

Caution Do not attempt to perform autoloader operations or power down the autoloader until after it automatically resets.

CREATING A DIAGNOSTIC LISTING VIA FTP

If you report a problem to Exabyte Technical Support, you may be asked to create a diagnostic listing (also called a *dump*) via FTP. A diagnostic listing is created when you use an FTP utility to send a copy of the autoloader's diagnostic buffer to a host computer. This information can be used by support personnel to troubleshoot incidents with the autoloader.

To create a diagnostic listing via FTP:

1. Connect to the autoloader's FTP interface by following the instructions on page 130.
2. Make sure the FTP file transfer type is set to ASCII.
3. Use the FTP command for your utility to get the diagnostic listing. For example, issue `get libtrace.txt`.
4. If necessary, specify a destination location (path and filename) for the diagnostic listing.

UPGRADING TAPE DRIVE FIRMWARE AND CREATING DIAGNOSTIC LISTINGS USING LTO TOOL

To upgrade firmware and create diagnostic listings for the LTO tape drive, download LTO Tool from www.exabyte.com. LTO Tool allows you to upgrade firmware and perform diagnostics over the autoloader's SCSI bus. Refer to the readme file provided with the program for installation instructions. Refer to the program's online help for instructions on performing upgrades and diagnostics.

You can obtain new tape drive firmware from Exabyte Technical Support (see page iv), or you can download new firmware at www.exabyte.com.

Caution Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your tape drive inoperable. Consult with Exabyte Technical Support before performing an upgrade.

8

TROUBLESHOOTING AND ERROR CODES

This chapter provides basic troubleshooting information for the autoloader and defines error codes that may appear on the autoloader's operator panel.

TROUBLESHOOTING

This section provides suggestions for solving problems that may occur when you are installing and operating the autoloader and the enclosed tape drive.

AUTOLOADER INSTALLATION PROBLEMS

If your autoloader and application software are not communicating after installation, check the following:

✔ **SCSI IDs.** Make sure that the SCSI IDs you selected for the tape drive and autoloader are not the same as the ID used by any other SCSI device on that bus, including the SCSI adapter card. Refer to page 29 for information about setting the SCSI IDs.

! **Important** The autoloader and its tape drive must each have a unique SCSI ID within each SCSI bus. Because you may have multiple buses, the autoloader does not check for duplicate SCSI IDs. It is your responsibility to make sure you do not assign duplicate IDs within a bus.

✔ **SCSI bus connections.** Make sure that you have connected the SCSI cables or terminators to the appropriate SCSI connectors on the back of the autoloader. See page 18 for more information. Make sure that all SCSI cables are securely connected at both ends.

- ✔ **LVD SCSI devices.** Because the autoloader is an LVD device, all other devices on the SCSI bus should also be LVD. These devices include the controller cards, cables, terminators, and any other devices on the SCSI bus. Do not mix LVD and HVD devices on the same bus.

  Note: Although LVD SCSI is compatible with single-ended SCSI, Exabyte does not support single-ended devices on the autoloader's LVD SCSI bus.

- ✔ **Wide SCSI devices.** Because the autoloader is a wide SCSI device, all other devices on the bus must be wide.

- ✔ **SCSI cable lengths**. Make sure the SCSI cabling for any of the buses attached to the autoloader does not exceed maximum lengths (see page 17).

- ✔ **Termination.** Make sure the SCSI buses are properly terminated as described on page 18. If another SCSI device previously terminated the SCSI bus and is no longer at the physical end of the bus, be sure to remove the terminator from that device.

- ✔ **Compatibility.** Make sure that your tape drive and autoloader are compatible with the adapter card and application software you plan to use. Visit Exabyte's web site at www.exabyte.com for compatibility information.

- ✔ **Adapter card installation.** Make sure that you installed your adapter card correctly. Refer to the documentation that came with your card for installation and troubleshooting instructions. Pay special attention to steps describing setting various jumpers and switches on the card. Make sure that the card is properly seated.

- ✔ **Software installation.** Make sure that your application software is installed correctly. (Refer to the software documentation.) Pay special attention to steps that describe how to configure the software for use with the autoloader and tape drive.

- ✔ **Control mode.** Make certain the control mode is set to SCSI or Sequential. See page 46 for more information.

After checking the items above, reset the autoloader as described on page 55.

AUTOLOADER OPERATION PROBLEMS

If the autoloader has been successfully operating in the past, but is now experiencing problems, check the following:

- ✔ **Control mode**. If you are using an application software package to control robot operations, the control mode must be set to SCSI. See page 46 for more information.

- ✔ **Security**. Make sure that security is set correctly for the operation you are trying to perform. If security is enabled, you cannot perform many operations from the LCD and you cannot open the door. Security can be enabled from the LCD (see page 41), from the remote management utility (see page 87) or from your application software.
- ✔ **Door**. Make sure the door is closed securely.
- ✔ **Robot operation**. You can use the selections in the Command Menu and the Demo Menu (see page 58) to determine if the robot is functioning properly.
- ✔ **Firmware level.** Make sure your autoloader contains the latest version of firmware. To check the current code level, see page 64. To determine whether you have the latest version, check the Exabyte web site at www.exabyte.com.

TAPE DRIVE OPERATION PROBLEMS

If you have been successfully operating the application software and autoloader in the past, but are now experiencing problems reading and writing data, check the following:

- ✔ **Cartridge type**. Use the appropriate LTO Ultrium cartridges for your tape drive (see page 13).
- ✔ **Write-protect switch**. If you are writing data, make sure the cartridge is write enabled (see page 14).
- ✔ **Cartridge age**. If the cartridge has been in use for a long time or if it has been used frequently, try using a new cartridge.
- ✔ **Cleaning**. Clean the tape drive as described on page 53.

ADVANCED TROUBLESHOOTING

If you report a problem to Exabyte Technical Support, you may be asked to create a diagnostic listing. To create a diagnostic listing, you can use the autoloader's serial port and Console interface program, or you can use the optional Ethernet port and an FTP utility. For more information about how to create diagnostic listings, see page 124. To create diagnostics listings for the tape drive, use LTO Tool, available at www.exabyte.com (see page 132).

To report a problem to Exabyte Technical Support, see page iv.

ERROR CODES

This section describes the error codes that can appear on the autoloader's operator panel and provides corrective actions. These error codes do not reflect tape drive errors. For information about LTO Ultrium error codes, refer to the LTO Ultrium tape drive documentation available from IBM Corporation or visit www.storage.ibm.com.

Caution Most autoloader components can be replaced only by Exabyte-approved service providers. If you cannot find an obstruction or other obvious cause for the problem, contact your service provider. Unless you have a self-maintenance contract, do not attempt to replace any components other than the tape drive. If you do, you will void your warranty.

For detailed information about SCSI error conditions, refer to the *Exabyte 110L, 215, 221L, and 430 SCSI Reference*.

Caution Some corrective actions advise you to reset the autoloader. Before resetting, make sure there is no SCSI activity on any connected SCSI bus, so you do not disrupt communications.

Table 8-1 lists the autoloader error codes in numerical order.

Table 8-1 *Autoloader error codes*

Code	Description	Corrective Action
11	**Source empty.** There is no cartridge in the source location for a move command.	Install a cartridge in the source location or redirect the robot to another location.
12	**Destination full.** A cartridge already exists in the destination location for a move command.	Remove the cartridge from the destination or redirect the robot to another location.
13	**Put failure.** The robot could not place a cartridge because of mechanical problems.	▪ Open the door and remove the magazine. Make sure there is nothing blocking the robot or the tape drive. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
14	**Pick failure.** The robot could not pick a cartridge because of mechanical problems.	
15	**No source element.** No magazine was installed at the selected location.	▪ Install the magazine or redirect the robot. ▪ If the magazine is already installed when either of these error codes displays, reset the autoloader (see page 55). ▪ If the error persists, contact your service provider.
16	**No destination element.** No magazine was installed at the selected location.	

Table 8-1 *Autoloader error codes (continued)*

Code	Description	Corrective Action
18	**Source inside drive.** The robot could not successfully pick a cartridge because it was still loaded in the tape drive.	▪ Open the door and manually eject the cartridge from the tape drive (see page 56). Or, redirect the robot to another source location. ▪ If the error persists, contact your service provider.
30	**R axis does not move.** The robot could not move along the reach axis.	▪ Open the door and remove the magazine. Look for anything that might be obstructing the gripper or the robot's path along the reach axis. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If there are no obstructions and the error persists, the robot may need to be replaced. Contact your service provider.
32	**Barcode module failure.** The bar code module is not functioning properly. (Applicable only if bar code scanner is installed.)	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, the bar code module may need to be replaced. You may need to supply a diagnostic listing; you may need new firmware. Contact your service provider.
34	**RRC sensor failure.** The robot gripper sensor failed.	▪ Open the door and remove the magazine. Look for anything that might be obstructing the gripper or the robot's path along the reach axis. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If there are no obstructions and the error persists, the robot may need to be replaced. Contact your service provider.
35	**RRC communication failure.** The autoloader cannot communicate with the robot gripper command processor.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
36	**RRC command reject.** An invalid command was sent to the robot command processor.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
38	**Cannot load drive.** The robot cannot load the cartridge into the tape drive.	▪ Open the door and remove the magazine. Look for anything that might be obstructing the robot along its reach axis. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider.

Table 8-1 *Autoloader error codes (continued)*

Code	Description	Corrective Action
41	**W axis failed home.** The autoloader could not move the robot to the home position on the wrist axis.	▪ Open the door and remove the magazine. Look for anything that might be obstructing the wrist axis rotation. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider.
42	**Wrist front sensor failed.** The autoloader could not determine the position of the robot on the wrist axis.	
43	**Wrist back sensor failed.** The autoloader could not determine the position of the robot on the wrist axis.	
60	**No label.** The bar code scanner could not read the bar code label because there was no label on the cartridge or the label was unreadable. (Applicable only if the bar code scanner is installed.)	This error appears on the Label Information screen. ▪ If the cartridge has a label, reposition or replace it (see page 14). ▪ If the label does not contain a checksum character, make sure the Verify Barcode Checksums option is off (see page 39). ▪ If the error persists, contact your service provider.
62	**Not present.** The bar code scanner could not read the bar code label because the designated element is not present. (Applicable only if the bar code scanner is installed.)	This error appears on the Label Information screen. If necessary, install the magazine or tape drive.
64	**Bad label checksum.** The bar code scanner could not read the label because of a problem with the checksum character. (Applicable only if the bar code scanner is installed.)	This error appears on the Label Information screen. ▪ If the label does not contain a checksum character, make sure the Verify Barcode Checksums option is off (see page 39). ▪ Check the label for damage and replace the label if necessary (see page 14). ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider.
70	**Mbus failed.** The robot command processor experienced an error.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
72	**Front door is open.** The door was open at an invalid time; or the door sensor is malfunctioning.	▪ Close and lock the door. ▪ Reset the autoloader (see page 55). ▪ If the error persists, the solenoid or door sensor may need to be replaced. Contact your service provider.

Table 8-1 *Autoloader error codes (continued)*

Code	Description	Corrective Action
73	**Stepper Move Fail.** T he firmware failed to complete a stepper move.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider.
74	**Unoccupied drive bay.** A tape drive is not installed in the drive bay.	▪ Install the tape drive. ▪ If the error persists, contact your service provider.
75	**Internal S/W error.** Firmware error.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware.
77	**Interface disabled.** The autoloader was not in the correct control mode when the operator sent a command.	▪ Set the autoloader to the correct control mode (see page 46).
91	**Command aborted.** A diagnostic command was aborted by the operator.	No corrective action required.
95	**Drive removed.** The tape drive was removed while the autoloader was powered on.	Power off the autoloader and install a tape drive (see page 121).
97	**Drive not present.** A move was requested to a drive that is not installed.	▪ Install a drive in the drive bay. ▪ If a drive is already installed when this message displayed, contact your service provider.
109	**Check cleaning tape.** A drive cleaning operation failed because the drive did not unload the cleaning cartridge within a reasonable amount of time or it unloaded the cartridge too soon.	▪ If necessary, eject the cartridge from the tape drive and remove it manually (see page 56). ▪ Install a new cleaning cartridge into the fixed slot (see page 15) and set the number of cleaning cycles available on the cartridge (see page 37). ▪ Repeat the cleaning operation if necessary. ▪ If the error persists, contact your service provider.
116	**Drive comm failed.** The autoloader is unable to communicate with the tape drive.	▪ Check the tape drive SCSI ID and change it, if necessary. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
117	**Drive comm timeout.** The autoloader is unable to communicate with the tape drive.	

Table 8-1 *Autoloader error codes (continued)*

Code	Description	Corrective Action
118	**Drive load cmd fail.** The autoloader was unable to load a cartridge in the tape drive.	▪ Open the door and remove the magazine. Look for anything that might be obstructing the robot's path along the horizontal axis. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If there are no obstructions and the error persists, the robot or a tape drive may need to be replaced. Contact your service provider.
119	**Drive not ready.** The tape drive did not return Ready status after a reset.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
120	**Drive cmd error.** The tape drive failed to respond to a command from the autoloader.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
130 131 132 133 134 135 136 137	**SCSI chip error: SCSI unexpected int; SCSI int stuck error.** There was a SCSI chip failure.	▪ Make sure all SCSI devices are of the same configuration (see page 17 for more information). ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
140	**Flash erase fail.** The autoloader is unable to erase the flash EEPROM.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider.
141	**Flash program fail.** The autoloader is unable to program the flash EEPROM.	
142	**Checksum miscompare.** The flash EEPROM checksum was bad.	
143	**Invalid header data.** The flash EEPROM header was invalid.	
144	**Can't program RRC card.** The RRC code load failed.	

Table 8-1 *Autoloader error codes (continued)*

Code	Description	Corrective Action
194	**All slots are full.** The robot could not find an empty cartridge slot.	▪ Open the door and remove at least one cartridge from the magazine or a fixed slot. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider.
195	**All slots are empty.** The robot could not find a cartridge to pick in Demo mode.	Open the door and insert at least one cartridge in the magazine.
198	**Robot full before command.** The robot, all slots, and the drive contain a cartridge when an Initialize Element Status command was requested.	▪ Open the door and remove the cartridge from the robot gripper. ▪ Reset the autoloader (see page 55).
199	**Tape in drive.** A cartridge is already loaded in the tape drive.	Eject the cartridge from the tape drive and remove it manually (see page 56). **Note:** This error only occurs when the autoloader is operating in sequential mode.
200	**X axis does not move.** The robot could not move along the horizontal axis.	▪ Open the door and remove the magazine. Look for anything that might be obstructing the robot's path along the horizontal axis. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If there are no obstructions and the error persists, contact your service provider.
201	**X axis has failed home.** The robot could not return to the home position along the horizontal axis.	
202	**X axis position sensor failed.** The autoloader could not complete a move along the horizontal axis.	
203	**X axis EOT fail.** The autoloader could not detect the end-of-travel sensor on the horizontal axis.	▪ Open the door and remove the magazine. Look for anything that might be obstructing the robot's path along the horizontal axis. ▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If there are no obstructions and the error persists, contact your service provider.
204	**X axis home sensor fail.** The autoloader could not detect the horizontal axis home sensor (safe rotate position).	
205	**X axis scan failed.** The autoloader could not complete a move along the horizontal axis.	
207	**X axis cal fail.** The robot position along the horizontal axis could not be calibrated.	

Table 8-1 *Autoloader error codes (continued)*

Code	Description	Corrective Action
213	**Invalid Xcard configuration.** An invalid combination of expansion cards is installed in the autoloader.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider. An expansion card may not be properly installed or the wrong card is installed.
214	**Invalid Slot Config.** The Maximum Number of Slots is set to 1 and the last slot is configured as a cleaning slot.	Change the Max Addressable Slot to a value greater than 1 (see page 40) or turn off the Clean Slot Option (see page 36).
220	**OS failure.** The autoloader's operating system experienced an error.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, contact your service provider.
221	**Could not set alarm.** The autoloader's operating system experienced an error.	
222	**OS message failure.** The autoloader's operating system experienced an error.	
226	**Mbus interrupt timeout.** The robot command processor timed out before setting an interrupt.	▪ Make sure the autoloader and tape drive are not being used by any host, then reset the autoloader (see page 55). ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
227	**Mbus acknowledge failure.** The robot command processor failed to respond to a command.	
230	**DHCP server timeout.** The Ethernet DHCP server could not assign an IP address for the autoloader.	Set the network address to Static and set the desired IP address (see page 31).

9

SHIPPING THE AUTOLOADER

This chapter describes the process of returning the autoloader for service.

If you need to return the autoloader for service, first contact your service provider. If your service provider instructs you to return the autoloader directly to Exabyte, contact Exabyte Technical Support (see page iv) to obtain a Return Materials Authorization (RMA) number and the shipping address. When you have the RMA number, follow the instructions on the following sections.

PREPARING THE AUTOLOADER FOR SHIPPING

To prepare the autoloader for shipping:

1. Before powering off the autoloader, select "Park and Unlock for Shipping" from the operator keypad. The robot moves to the correct position to accommodate the packing materials, and the door unlocks.
2. Remove all cartridges from the magazine and fixed slots. Make certain the robot gripper and the tape drive do not contain cartridges. If you need to eject a cartridge from the tape drive, see page 56.
3. Power off the autoloader.
4. Remove the power cord, the SCSI cables, and any terminators. Do not ship these items if you are returning the autoloader to the factory.
5. If you have a rack-mounted autoloader, continue with the following section. If you have a standalone autoloader, go to "Packing the Autoloader" on page 145.

REMOVING THE AUTOLOADER FROM THE RACK

If the autoloader is installed in a rack, remove it as follows:

1. From the back of the autoloader, use a T-20 TORX driver to remove the three screws that secure the retention bracket to the rack shelf and autoloader, as shown in Figure 9-1. Remove the bracket.

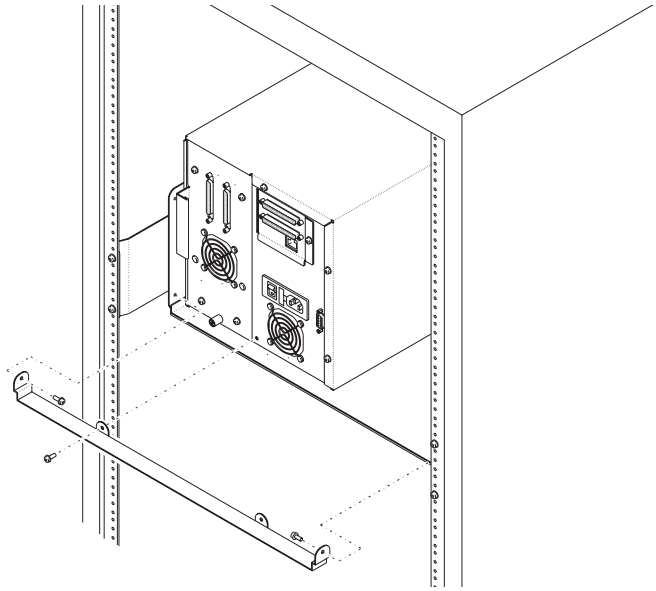


Figure 9-1 *Removing the retention bracket*

2. If the autoloader is the only device on the rack shelf, remove the blank panel from the empty side of the rack, as shown in Figure 9-2.

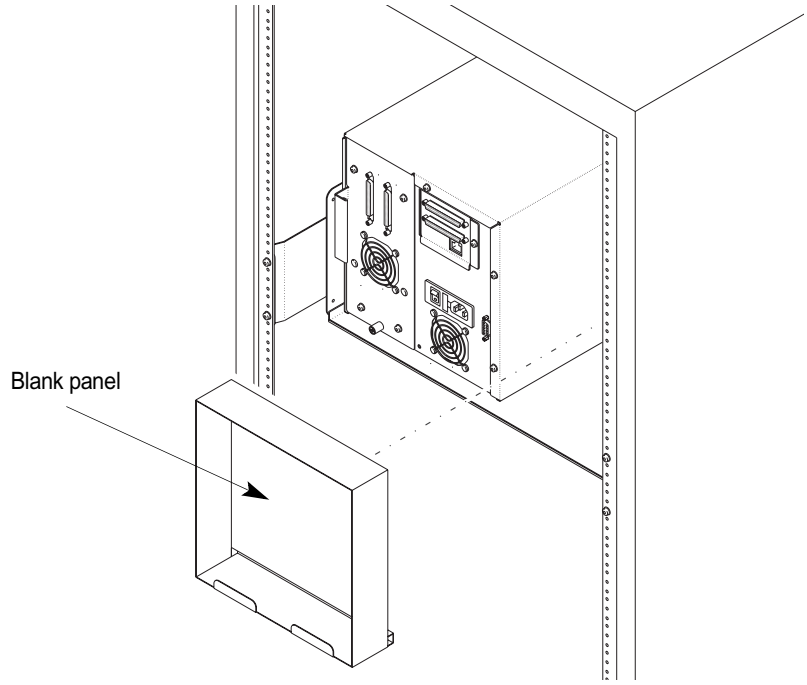


Figure 9-2 *Removing the blank panel*

3. From the back, slide the autoloader off of the rack shelf.

Warning The autoloader weighs 42 pounds (19 kg). Most of the weight is toward the back of the autoloader.

PACKING THE AUTOLOADER

Use the original packing materials to pack the autoloader (shipping containers, robot packing piece, and antistatic bag). You will also need packing tape and banding material.

Caution To avoid damaging the autoloader and voiding your warranty, be sure to use the original shipping materials (or replacement materials obtained from your vendor) when repacking and shipping the autoloader. Do not use the shipping carton and packing materials to ship items other than an autoloader.

Warning The autoloader weighs 42 pounds (19 kg). Most of the weight is toward the back of the autoloader.

To pack the autoloader:

1. Secure the robot with the robot shipping brace, as follows:
   a. Remove the magazine from the autoloader.
   b. Place the robot's shipping brace inside the magazine so it is centered vertically and horizontally, as shown in Figure 9-3.
   c. Install the magazine in the autoloader, so that the cut-out in the shipping brace fits around the robot.

d. Close the autoloader door.

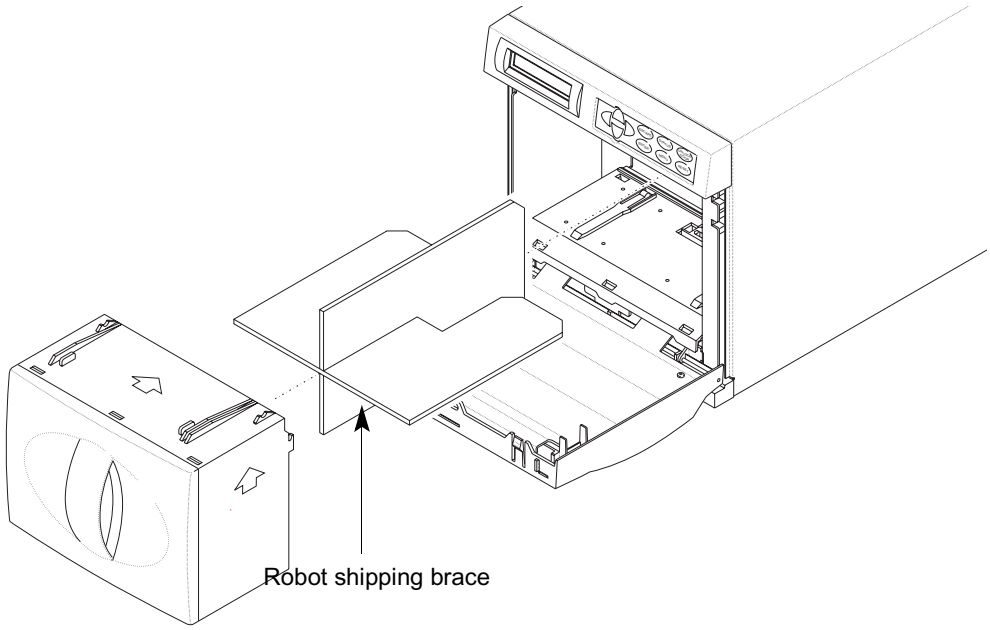


Figure 9-3 *Installing the robot shipping brace in the magazine*

2. Insert the empty accessory box or filler tube (if your autoloader did not come with an accessory box) into the autoloader box, as shown in Figure 9-4.

Important If you are shipping the autoloader for repair, do not include the accessories.

3. Place the antistatic bag over the autoloader, and place the autoloader into the cushion at the bottom of the box.

4. Place the top cushion over the autoloader.

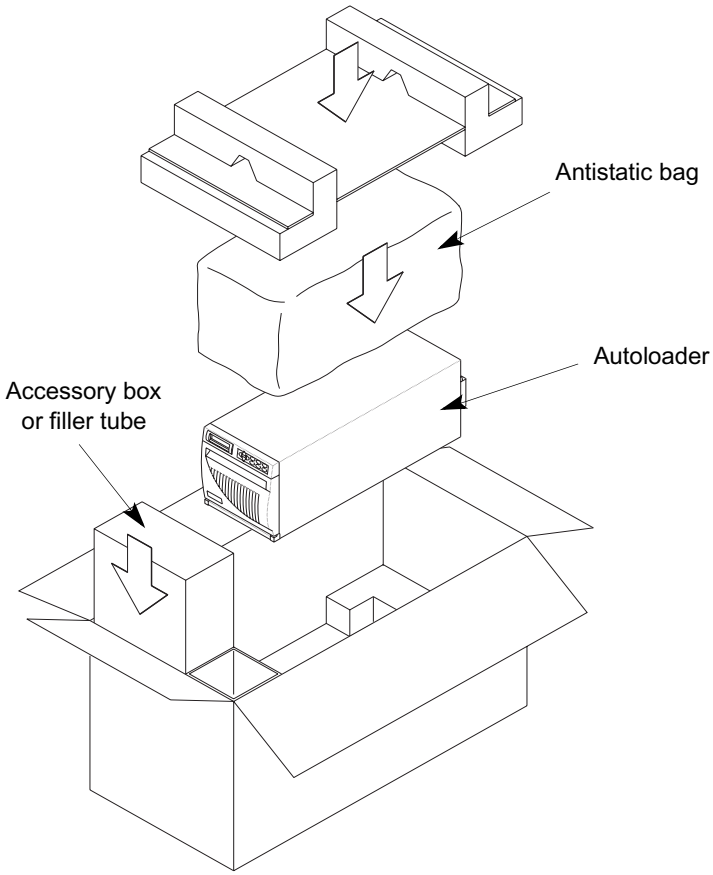


Figure 9-4 *Packing the autoloader for shipment*

5. Place any necessary paperwork in the top of the autoloader box.
6. Close and seal the box.
7. Place the shipping label on the box.

NOTES

A

AUTOLOADER SPECIFICATIONS

This appendix provides the following information about the autoloader:

- Storage capacity
- Size and weight
- Performance specifications
- Power specifications
- Environmental specifications
- Shipping specifications
- Safety and regulatory agency compliance

STORAGE CAPACITY

The maximum storage capacity of the autoloader depends on the model of tape drive installed and the number of cartridges installed, as shown in Table A-1.

Table A-1 *Maximum autoloader storage capacity*

Tape Drive	Maximum Capacity per Cartridge[a]	Maximum Library Capacity (10 Data Cartridges[a])
LTO Ultrium 1	200 GB (LTO-1 cartridge)	2 TB (LTO-1 cartridges)
LTO Ultrium 2	400 GB (LTO-2 cartridge)	4 TB (LTO-2 cartridges)
LTO Ultrium 3	800 GB (LTO-3 cartridge)	8 TB (LTO-3 cartridges)

[a] Assuming a 2:1compression ratio.

SIZE AND WEIGHT

The autoloader's dimensions and weight are listed in Table A-2.

Table A-2 *Dimensions and weight*

Length	61.21 cm (24.10 inches)
Width	21.7 cm (8.56 inches)
Depth	21.97 cm (8.65 inches)
Weight	19 kg (42 pounds) without the cartridge magazine and cartridges

PERFORMANCE SPECIFICATIONS

This section describes the following performance specifications for the autoloader:

- Data transfer rate
- Tape drive performance
- Self-test times
- Cartridge inventory times
- Move complete time
- Robot reliability

DATA TRANSFER RATE

The data transfer rate for the autoloader depends on the model of tape drive installed, as shown in Table A-3

Note: Compression, capacity, and throughput will vary dependent upon type of data and system configuration.

Table A-3 *LTO Ultrium tape drive transfer rates*

Tape Drive	Maximum Data Transfer Rate
LTO Ultrium 1	15 MB per second (native), 108 GB per hour (compressed[a])
LTO Ultrium 2	35 MB per second (native), 252 GB per hour (compressed[a])
LTO Ultrium 3[b]	80 MB per second (native), 576 GB per hour (compressed[a])

[a] Assuming a 2:1 compression ratio.

[b] When connected to an Ultra160 (Ultra3) SCSI bus. All sustained data rates are dependent on the capabilities of the SCSI bus (for example, an Ultra2 SCSI bus is limited to less than 40 MB/second).

TAPE DRIVE PERFORMANCE

When installed in the autoloader, the tape drive performs within its specifications. For more information about tape drive performance specifications, refer to the LTO Ultrium tape drive documentation available from IBM Corporation.

SELF-TEST TIMES

Power-on Self-Test Time Each time the autoloader is powered on, it performs a power-on self-test (POST). During POST, the autoloader:

- Loads firmware code into RAM
- Powers on the tape drive
- Verifies the SCSI IDs
- Engages the solenoid latch on the door
- Moves the robot to the home position
- Performs a complete cartridge inventory

If the cartridges are properly installed, the autoloader is ready for operation. If any cartridge is not properly installed, the autoloader reports an error and the robot returns to the home position.

The POST time is measured from the time the autoloader is powered on until the autoloader indicates Ready status. The maximum time required for POST is 38 seconds with no bar code scanner installed or with the POST Bar Code Scan option disabled (see page 38). If the optional bar cod scanner is installed and the POST Bar Code Scan option is enabled, the autoloader scans all of the bar code labels. Using this option increases the time for POST by 18 seconds.

Self-Test Time Once the autoloader is powered on, it performs a self-test each time the door is opened and closed. During a self-test, the autoloader:

- Engages the solenoid latch on the door
- Moves the robot to the home position
- Performs a complete cartridge inventory

If the cartridges are properly installed, the autoloader is ready for operation. If any cartridge is not properly installed, the autoloader reports an error and the robot returns to the home position.

The time for this self-test is measured from the time the door is closed and locked until the autoloader indicates Ready status. The maximum time required for a self-test is 21 seconds with no bar code scanner installed or with the POST Bar Code Scan option disabled (see page 38). If the optional bar code scanner is installed and the POST Bar Code Scan option is enabled, the autoloader scans all of the bar code labels. Using this option increases the time for the self-test by 18 seconds.

CARTRIDGE INVENTORY TIMES

An application can issue a command to the autoloader to check all storage locations for cartridges. Storage locations include the magazine slots and the fixed cartridge slots. After checking the storage locations, the autoloader updates its cartridge inventory.

If the optional bar code scanner is installed and the autoloader scans the bar code labels on the cartridges, the average cartridge inventory time is 30 seconds. If the autoloader does not scan bar code labels, the average cartridge inventory time is 14 seconds.

MOVE COMPLETE TIME

Move complete time is measured from the time the autoloader receives a move command to the time the autoloader returns status to the initiator indicating that the move is complete. A move is measured from a slot to the tape drive or from the tape drive to a slot. The average move complete time for the autoloader is 12 seconds. Move complete time includes the following:

- Average time for the robot to pick the cartridge from the source slot or tape drive (3 seconds)
- Average time for the robot to move the cartridge to the destination slot or tape drive (4 seconds)
- Average time for the robot to place the cartridge in the destination slot or tape drive (5 seconds)

ROBOT RELIABILITY

The mean cycles between failures (MCBF) for the autoloader's robot is 1,000,000 cycles. This value does not include failures attributable to the tape drive, data cartridges, or the data cartridge magazine.

During one full cycle, the robot completes the following actions:

- Picks the cartridge from a cartridge slot.
- Places the cartridge in the tape drive.
- Removes the cartridge from the tape drive.
- Replaces the cartridge in the cartridge slot.

POWER SPECIFICATIONS

This section describes the following power specifications for the autoloader:

- AC input voltages and power consumption
- Power cord specifications

AC INPUT VOLTAGES AND POWER CONSUMPTION

The autoloader includes an internal power supply that is capable of accepting 100 to 240 VAC at 50 to 60 Hz. The autoloader has automatic AC input voltage selection. The autoloader is capable of continuous operation when the AC power experiences intermittent operation, voltage surges, and voltage spikes.

The power consumption of the autoloader varies depending on the function being performed, as shown in Table A-4.

Table A-4 *AC power consumption (AC true power)*

Average While Idle	61 watts
Average While Operating	88 watts
Maximum While Operating	105 watts
Average Heat Output While Operating[a]	300 BTU/hour

[a] Based on the AC true power consumption.

POWER CORD SPECIFICATIONS

The autoloader is shipped with two power cords: One for use in the US and Canada, and one for use in Europe.

The US/Canada power cord is a 2.1-meter (7-foot), three-conductor, 18 AWG power cord for 120-volt use. The power cord has a molded NEMA 5-15P male connector on one end and a molded IEC 320/EN60320 female connector on the other end. The power cord is UL Listed and CSA Certified.

The European power cord is a 2.5-meter (8.2-foot), three-conductor power cord for 230 to 250-volt use. The power cord has a CEE 7 Standard VII, dual earthing male connector on one end, and an IEC 320 C13 female connector on the other end. The cordage is CENELEC HD-21. The power cord is VDE approved.

Requirements for International 220 VAC Power Cord

If you plan to use the autoloader in a location other than the US/Canada or Europe, you must supply a power cord that meets the following specifications.

- The power cord must have a grounded attachment plug of the proper type, rating, and safety approval for the intended country.
- The power cord must have an IEC 320/EN60320 female connector on one end.
- The cordage must be harmonized to CENELEC publication HD-21. The electrical characteristics and rating must be minimum H05VVF3G0.75 (6 A).

ENVIRONMENTAL SPECIFICATIONS

This section describes the following environmental specifications for the autoloader:

- General environmental specifications
- Particulate contamination limits
- Acoustic noise limits
- Shock and vibration limits

GENERAL ENVIRONMENTAL SPECIFICATIONS

Table A-5 lists general environmental specifications for the autoloader.

Table A-5 *Environmental specifications*

Specification	Operating[a]	Storage[b] or Non-Operating[c]	Transportation[d]
Ambient Temperature Range	+10° C to +35° C (+50° F to +95° F)	–20° C to +60° C (–4° F to +140° F)	–20° C to +60° C (–4° F to +140° F)
Temperature Variation[e] (Thermal Gradient)	1° C per minute; max 10° C per hour (2° F per minute; max 18° F per hour)	1° C per minute; max 20° C per hour (1° F per minute; max 36° F per hour)	1° C per minute; max 20° C per hour (2° F per minute; max 36° F per hour)
Relative Humidity	20% to 80%; Non-condensing	10% to 90%; Non-condensing	10% to 90%; Non-condensing
Wet Bulb	26° C (79° F) max	29° C (84° F) max	29° C (84° F) max
Altitude	–304.8 m to +3,048 m (–1,000 ft to +10,000 ft)	–304.8 m to +3,048 m (–1,000 ft to +10,000 ft)	–304.8 m to +12,192 m (–1,000 ft to +40,000 ft)

[a] All operating specifications include a data cartridge. These measurements assume that the autoloader is installed in accordance with the instructions in this manual.

[b] The autoloader is in its original packaging. The packaging is designed to protect the autoloader from the condensation caused by extreme temperature variations (15° C or more). **When the autoloader is moved from a cold storage environment to a warm operating environment, it must acclimate in its packaging for at least 12 hours before opening to prevent serious condensation damage from occurring.**

[c] The autoloader has been unpacked.

[d] The autoloader has not been unpacked. The transportation period does not exceed 72 hours.

[e] The data cartridges' temperature and humidity must be allowed to stabilize in the specified ambient environment for 24 hours.

Figure A-1 is a psychrometric chart that indicates the operating temperature and humidity ranges for the autoloader. The dotted line represents the operating environment limits. Table A-6 defines the temperature and humidity points shown in Figure A-1.

Table A-6 *Temperature and humidity points for psychrometric chart*

Point	Dry Bulb Temperature	Relative Humidity
A	10° C	80%
B	29° C	80%
C	35° C	50%
D	35° C	20%
E	10° C	20%

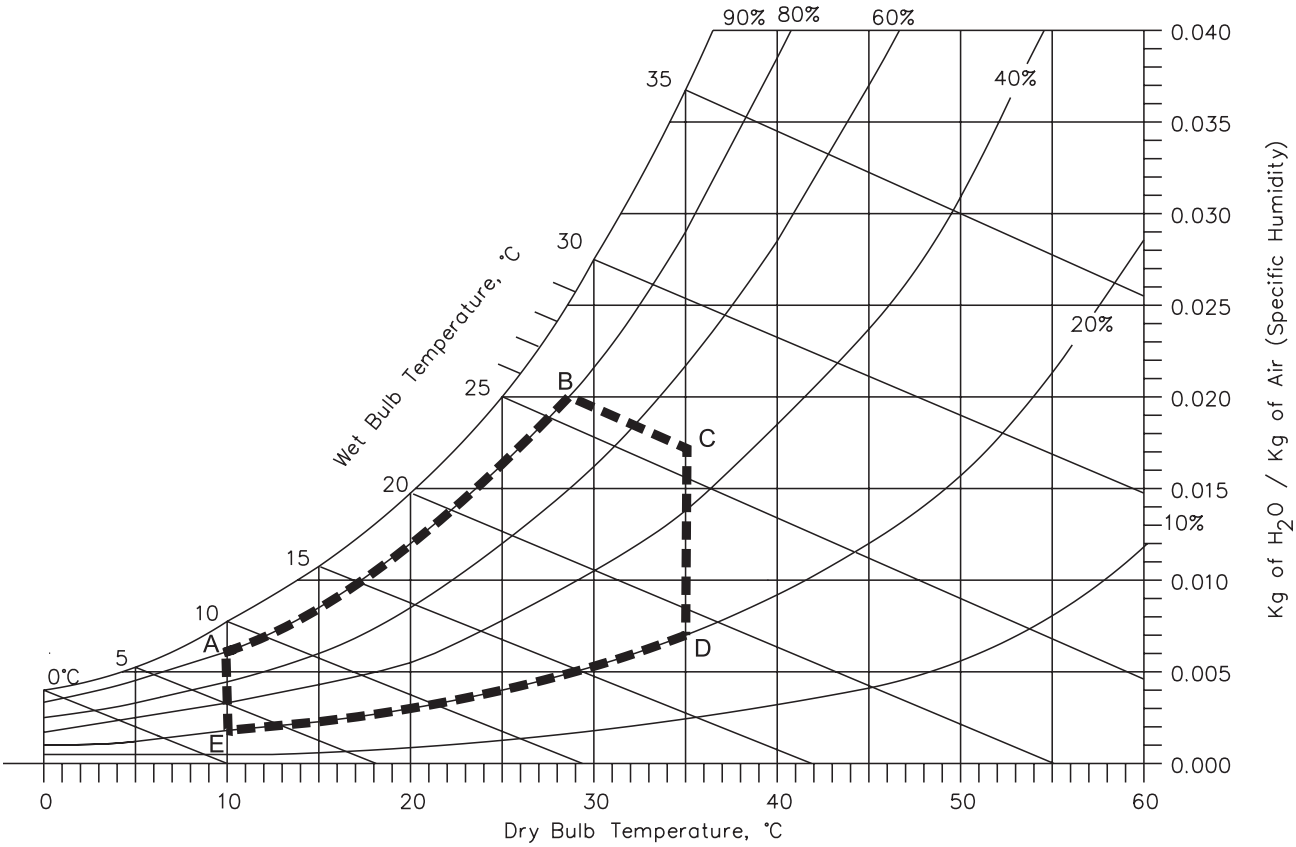


Figure A-1 *Temperature and humidity ranges for autoloader operation*

PARTICULATE CONTAMINATION LIMITS

The ambient operating environment for the autoloader should not exceed the particulate counts specified for the tape drive. For more information, refer to the LTO Ultrium tape drive documentation available from IBM Corporation.

ACOUSTIC NOISE LIMITS

The overall, averaged A-weighted sound pressure level (in decibels) for the autoloader does not exceed the upper limits specified in Table A-7.

Table A-7 *Acoustic noise limits*

Operating Mode	Lp_A[a]
The autoloader is powered on and idle.	56 dBA
The autoloader is operational (the robot is moving); the tape drive is operating in streaming mode.	56.5 dBA[b]

[a] L_{pA} is the average A-weighted sound pressure level over the following frequency range: 5 Hz to 12.5 KHz.

[b] Represents a maximum sustained operational level.

SHOCK AND VIBRATION LIMITS

The autoloader will operate normally after experiencing shock loads as specified in Table A-8. The operating shock levels indicate how much shock the autoloader can withstand while the enclosed tape drive is reading and writing data. The non-operating and storage shock levels indicate how much shock the autoloader can withstand when it is not operating. After experiencing this amount of shock, the autoloader will operate normally.

Table A-8 *Shock limits*

Operating[a]	Storage[b] or Non-Operating[c]	Transportation[b]	Handling
3g for 5 msec[d]	30g at 118 in/sec[e]	ISTA Procedure 1C	Drop and Topple per IEC 68-2-31

[a] The autoloader is unpacked and is picking and placing cartridges from the data cartridge magazine and tape drive.

[b] The autoloader has not been unpacked.

[c] The autoloader has been unpacked, but no power has been applied.

[d] A minimum of 20 shock pulses were applied to the vertical axis. The shock pulses were half-sine waves and were applied at a rate not exceeding one shock per second.

[e] A minimum of three 20g shock pulses were applied to each of the autoloader's six sides.

Table A-9 lists the vibration specifications for the autoloader during operation, non-operation, storage, and transportation. The operating specifications indicate the amount of vibration the autoloader can withstand while the enclosed tape drive is reading and writing data.

Table A-9 *Vibration limits*

Random Vibration[a] Applied During Operation	
1 Hz	PSD = 0.0000040 g^2/Hz
5 Hz	PSD = 0.0000270 g^2/Hz
10-150 Hz	PSD = 0.0004048 g^2/Hz
200-400 Hz	PSD = 0.0001079 g^2/Hz

Table A-9 *Vibration limits (continued)*

Random Vibration[b] Applied During Non-Operation[c] and Storage[d]	
1 Hz	PSD = 0.0003 g^2/Hz
3 Hz	PSD = 0.00055 g^2/Hz
12-100 Hz	PSD = 0.01 g^2/Hz
400 Hz	PSD = 0.000003 g^2/Hz
Transportation[d]	
ISTA Procedure 1C	
Swept Sine Applied During Non-Operation[e] and Operating[f]	
5 to 500 to 5 Hz	

[a] A 0.3 G rms random vibration spectrum is applied to the vertical axis for a minimum of 20 minutes per axis

[b] A 1.06 G rms random vibration spectrum is applied to each of three orthogonal axes for a minimum of 20 minutes per axis.

[c] The autoloader has been unpacked, but is not operating.

[d] The autoloader is packaged in its original shipping container.

[e] Three sweeps at one octave per minute are applied to each axis at 0.75 g (0 – peak) input.

[f] Three sweeps at one octave per minute are applied to the vertical axis at 0.3 g (0 – peak) input.

SHIPPING SPECIFICATIONS

The autoloader's carton and internal packing pieces are designed so that the enclosed autoloader does not receive a shock greater than 30 g when the carton is dropped on the bottom or sides from a height of 8 inches (20.3 cm). The autoloader's shipping carton passes the tests described in the International Safe Transit Association (ISTA) Procedure 1C.

Table A-10 lists the weight and dimensions of the autoloader when it is packed in the shipping carton. The shipping weight includes an accessory carton.

Table A-10 *Shipping weight and dimensions*

Shipping Weight	Dimensions (Length x Width x Depth)
22.2 kg (49.0 lbs)	91.13 × 38.1 × 40.33 cm (35.88 × 15.00 × 15.88 inches)

Packing instructions are provided in Chapter 9. To avoid damaging the autoloader, use the original shipping carton and packing materials (or replacement packaging obtained from your vendor) when repacking and shipping the autoloader. The shipping carton and packing materials are not intended to be used for shipping items other than or in addition to an autoloader.

SAFETY AND REGULATORY AGENCY COMPLIANCE

This section describes the autoloader's compliance with safety and regulatory agency standards.

Important To comply with the following regulations and standards, you must use shielded cables and provide adequate grounding of the SCSI bus and the input power when installing the autoloader in an office or industrial environment.

SAFETY AGENCY STANDARDS

The autoloader complies with and is certified to the applicable requirements of the following domestic and international product safety standards:

- UL Standard 1950, 3rd Edition, Information Technology Equipment including Electrical Business Equipment
- CSA Standard C22.2 No. 950-95, Safety of Information Technology Equipment including Electrical Business Equipment
- IEC 950 (EN 60950), Safety of Information Technology Equipment including Electrical Business Equipment

LASER SAFETY STANDARDS

The autoloader complies with the following laser safety standards:

- 21 CFR 1010.10 and 1040.11, Class I for laser products
- IEC 825-1, Safety of Laser Products, Part 1: Equipment Classification, Requirements and User's Guide

RADIATED AND CONDUCTED RADIO FREQUENCY EMISSIONS (EMI)

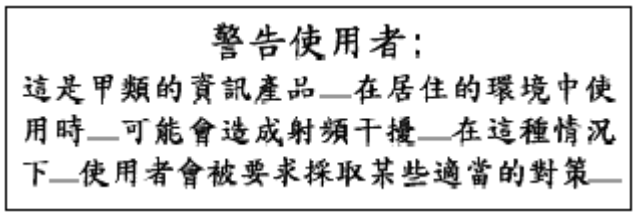
The autoloader meets the requirements for radiated and conducted emissions as defined by the following standards:

- FCC Rules and Regulations, Part 15, Class A: Radio Frequency Devices, Subpart B: Unintentional Radiators

Caution According to FCC regulations, changes or modifications to the autoloader that are not expressly approved by Exabyte may void the user's authority to operate the autoloader.

- Industry Canada Notice, ICES-003, Class A, Digital Apparatus
- CISPR Publication 22, (EN 55022), Class A

- VCCI Class 2 (Japan)
- BSMI CNS 13438, Class A (Taiwan)



ELECTROSTATIC DISCHARGE (ESD) IMMUNITY

The autoloader complies with EN 61000-4-2:1995, Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Part 2: Electrostatic Discharge (ESD) Immunity.

Exabyte has extended testing as follows:

- Up to 12,000 volts (V) air discharge applied to all non-metallic surfaces
- Up to 8,000 V direct discharge applied to all metallic/conductive surfaces

In each case, there is no degradation or non-recoverable loss of function due to damage of equipment or firmware.

RADIATED RADIO FREQUENCY FIELD IMMUNITY

The autoloader complies with EN 61000-4-3:1996 and ENV 50204:1995, Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Part 3: Radiated Radio-Frequency Immunity.

The autoloader will continue to operate without error while being exposed to an electromagnetic field of 3V/m.

ELECTRICAL FAST TRANSIENT (EFT)/BURST IMMUNITY

The autoloader complies with EN 61000-4-4: 1995, Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Section 4: Electrical Fast Transient/Burst Immunity.

The autoloader will continue to operate without error when exposed to EFT of ±1,000 V on the AC power ports and ±500 V on the I/O ports.

SURGE IMMUNITY

The autoloader complies with EN 61000-4-5:1995, Electromagnetic Compatibility, Part 4: Testing and Measurement Techniques, Section 5: Surge Immunity.

The autoloader will continue to operate without error after being subjected to surges up to ±2,000 V.

CONDUCTED RADIO FREQUENCY FIELD IMMUNITY

The autoloader complies with EN 61000-4-6:1996, Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Section 6: Conducted Radio Frequency Immunity.

The autoloader will continue to operate without error while being exposed to a field of 3 $V_{(rms)}$. The field is 80% amplitude modulated (AM) with a 1 kHz signal.

VOLTAGE DIPS, INTERRUPTIONS, AND VARIATIONS IMMUNITY

The autoloader complies with EN 61000-4-11:1994, Electromagnetic Compatibility (EMC), Part 11: Voltage Dips, Short Interruptions, and Voltage Variations Immunity.

The autoloader will continue to operate without error after being exposed to a 30% voltage dip for 500 ms. The autoloader will be self-recoverable or can be restored by the operator after being exposed to a 95% voltage dip for 10 ms and after an interruption of 5 seconds.

HARMONIC CURRENT EMISSIONS

The autoloader meets the requirements for harmonic current emissions as defined by EN 61000-3-2: 1995, Electromagnetic Compatibility (EMC) Part 3: Limits, Section 2: Limits for Harmonic Current Emissions for equipment with an input current ≤ 16 A per phase.

VOLTAGE FLUCTUATIONS AND FLICKER

The autoloader meets the requirements for voltage fluctuations as defined by EN 61000-3-3: 1995, Electromagnetic Compatibility (EMC) Part 3: Limits, Section 3: Limits of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A.

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